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EDITORIAL NOTES—GAS, &c.

The Gas Promotions.

NEXT session of Parliament in respect of gas promotions will undoubtedly be somewhat better than its immediate predecessors. "Somewhat" is the expression that best suits the length in description and prophecy that a scrutiny of the notices of the gas promotions enables us to go. There were only some twenty measures dealing with gas in the session now nearing the end of its wearying length; and about a third of them were Local Authority "Omnibus" Bills which gave shelter to new gas powers merely in the form of a section. Of Gas Provisional Orders, there were only half-a-dozen all told. For the coming session, there is the promise of sixteen Gas Company's Bills, fourteen Bills by Local Authorities dealing wholly or partially with gas, and nineteen Gas Provisional Orders. This is a decided improvement; and there will be no little thanksgiving if the session now passing into history marks the last of the "lean" years, and the coming one the beginning of the return to greater activity, in Private Gas Bill legislation.

Last week we commenced the publication of the list of Bills for next session, and complete it to-day. Special attention was also drawn a week ago to the Gaslight and Coke Company's Bill, proposing among other things, amalgamation with the West Ham Gas Company and the reduction of the illuminating power standard. This Bill will rank foremost in the list. Since the discussion of the proposals of the measure, memory has directed attention to a passage in our "Notes from Westminster" on March 21, 1905, dealing with the London County Council Gas Bill of that session. It was then mentioned that, "in the course of his "address, the Committee elicited from Sir Ralph Littler that, "though the County Council were not proposing it, they would "like to see uniformity in the gas supply of London, even to "the reduction of the Gaslight and Coke Company's gas from "16 to 14 candles, in view of the fact that Parliament had per-"mitted both the South Metropolitan and Commercial Gas "Companies to reduce their power." This is interesting in view of the present proposal for a reduction of illuminating power, which is another—if another were needed—indication of the change from the conservative and unprogressive policy of the Board of a past day. While the Gaslight Company are proposing, by agreement, the annexation of the West Ham Company's area, the movement that set-in a few sessions ago of absorption by large Companies of the first rank of smaller concerns operating in their purlieus, is being continued. The Aldershot Company, it will be seen, are bent on incorporating in their undertaking a couple of limited Companies—the Hartley Witney and the Odiham. The Eastbourne Company are proposing to annex the Hailsham Company; and the Long Eaton Company (in this case through a Provisional Order) the Sandiacre undertaking. Experience shows the mutual advantage that accrues from amalgamations such as these. The Amman Valley Company are applying to Parliament for dissolution and reincorporation, with statutory powers. This is one of the notorious Eaton group of promotions; and there are many in Wales who would be glad to see the final dissolution of the concern, and even to take part in putting an end to it. The Company have done no good to the reputation of the Welsh section of the gas industry. There is another measure, promoted by the Ammanford Gas Company, in which Parliament is asked to permit of the acquisition of the Amman Valley concern by compulsion or agreement. Most of the Bills will suggest an extension of the limits of supply; and in this connection a tussle is inevitable between the Aldershot Company and the Yorktown and Blackwater Company over a portion of territory common to the two areas of supply. The former Company also ask for the repeal of the powers of the Ascot Company in the parish of Ash.

There is quite a revival of life in local authority promotions for the acquisition of gas undertakings, which is significant of the municipal faith in gas supply not having been shattered by the extensive investment by local authorities in electricity supply and by the experiences that have issued therefrom. It is not surprising, after what transpired this year, to find the Swinton and Mexborough authorities taking advantage of the permissive power placed upon them by Parliament to jointly ask for sanction to the formation of a Joint Board for acquiring the Swinton and Mexborough gas undertaking. The Bradford Corporation, in pursuance of their annexation policy, are seeking to be invested with powers to enter into an agreement with the Pudsey and the Drighlington and Gildersome Gas Companies and Sir H. W. Ripley for the transfer of their undertakings. The Congleton Corporation have set their eyes on the Biddulph Company's undertaking; but the smaller Company are manifestly not desirous of relinquishing their property, seeing they have given notice of a Bill of their own. The Lisburn, Risca, Sheringham, and Fermoy authorities are anxious to become the owners of the works in their respective localities—the Western Valleys (Mon.) Gas and Water Company being the possessors of the undertakings the Risca District Council will seek the right to purchase. The Prestatyn Council also desire ownership of the local works, on behalf of the present owners of which notice has been given for a Provisional Order for capital and other powers. This also suggests the present existence of an indisposition to sell.

Several of the promoters are asking for fresh land powers for manufacturing purposes, which is a feature of gas legislation that our gas-plant producing friends like to see. The current of policy in respect of lower illuminating power is flowing strongly. In the coming promotions—Company and Local Authority alike—this will be seen; and it is particularly noteworthy that certain of the most important local authorities in the North are going to ask for reductions of their standards, accompanied by the modern testing method, which has been endorsed by Parliament session after session. Powers of consolidation and conversion of capital will be requested by certain Companies; and the Aldershot Company announce their intention of making special provision for interesting their consumers and employees in the fortunes of the Company by becoming stockholders. Extensive electricity supply powers are going to be sought by Aldershot and the Yorktown Companies; and the Wells Gas Company will make electricity one of the features of their promotion. The Alliance and Dublin Consumers' Gas Company will, in accordance with the precedents of recent sessions, ask to be relieved of penalties for the presence of sulphur compounds in the gas other than sulphuretted hydrogen. This is only one point among several modern powers that the Company will seek to have established for the benefit of their consumers and concern. The Congleton Corporation, among the miscellaneous proposals of their Bill, will request sanction to making charges for the supply of gas to premises having an independent supply. It is hoped they will satisfy Parliament as to the righteousness of granting gas suppliers the same power in this regard that is freely accorded to electricity suppliers. This reminds that the Aldershot Company are seeking for authorization to distribute power gas; and the Harrogate Gas Company are asking sanction to be of still greater service, by providing, where required, acetylene, gasolene, suction, or any other gas that can be conveniently generated, in the parts of their supply area to which the gas distribution system does not yet extend, and, indeed, we take it, anywhere where suction or other producer gas is preferred. We shall watch with peculiar interest the novel clause that will likely appear in the Heckmondwike and Liversedge Gas Company's Bill, by which it will be sought to give the Directors discretionary powers in the matter of supplying lists of shareholders notwithstanding the much-abused section 10 of the Companies' Clauses Act of 1845. Parliament appears of late to have a sort of horror of infringing in any degree the provisions of a General Act through a Private Bill; but it is to be hoped the parliamentary authorities will

allow the Heckmondwike Company to show cause why discretionary power in this matter should be granted them. We do not suppose that Mr. Eaton and his associates will present a petition, and put in appearance as witnesses, against the Heckmondwike Company's proposal, though such action on their part would be heartily welcomed.

Oldham Policy and Powers.

THE cordiality of the reception that Oldham gave the members of the Manchester District Institution on Saturday was precisely in accord with the traditional good nature of the town to those who, in corporate state, pay it a visit. Mr. Tim Duxbury is the President of the Institution this year; and he is the Engineer of the Oldham Corporation Gas-Works. In welcoming the members in his official and presidential capacity to the town, he had the warm-hearted support of the municipal authorities, and of the General Manager of the Gas Department, Mr. Arthur Andrew. There were no formal technical matters for consideration in the programme arranged for the day. The need for any was absent, as, though the Oldham Gas-Works are not precisely of æsthetic stamp, but have been built, as most other things have been built in this industrial centre, on the principles of the hard-and-fast economist with a propensity for modern efficiency, there is about them a wealth of interesting condition, much of which—as the "JOURNAL" records show, and the souvenir carried away by the members on Saturday confirm—is the creation of quite recent times. The visit to the works formed an excellent supplement to Mr. Duxbury's presidential address delivered in February last, in which he supplied data obtained from the operation of the plant that has now been inspected. There is nothing about the plant or works that calls for any special comment here; but the particulars that are given as to the efficacy of the "Derby" solvene in relieving Oldham from the vivacious but unwelcome attentions of naphthalene are worth pointing by reference. By the use of 0·2 gallon of the solvene per ton of coal carbonized from April to October, and 0·1 gallon from November to March, the number of stopped services and public lamps has, Mr. Duxbury states, been reduced to almost vanishing-point. In the twelve months prior to using the solvene, about 2000 service-pipes and 10,000 public lamps were stopped; the reductions have been to 30 and 129 respectively. The figures certify efficiency.

The people of Oldham have been served well by the Municipal Gas Department since the works were acquired in 1854. The price of gas was then 3s. 11d. per 1000 cubic feet; the average price realized to-day is 1s. 11½d. But we contend that this average price in Oldham ought to be still lower. During the time the works have been under the control of the Corporation, £390,000 have been transferred to the public treasury in aid of the rates, and there has been a gratuitous use of gas in municipal buildings and street-lamps, amounting in value to £158,000; so that the town has benefited to the extent of £548,000. Now let us point out at once that this sum exceeds—mark this!—by about £58,000 the total amount (£490,232) borrowed for the purposes of the undertaking to March 25, 1907, including the capitalized value of the annuities, and not deducting the amount repaid. Consider these figures, consider the excess of already accrued financial benefit over money borrowed, and then see if any reasonable answer can be found to the questions, What have the ratepayers, *quâ* ratepayers, done that they should have their rates further relieved from the profits of the undertaking; what have they done that they should be entitled to a further supply of free gas? Have they found the capital for the undertaking? No! Have they found the money for sinking fund and interest? No! What, then, have they done to entitle them to the hundreds of thousands of pounds benefit already received? Nothing! What is there that makes them, from the point of view of equity, deserving of further consideration? We fail to find anything. The gas consumers have supplied the money for the sinking fund and interest; they have maintained the works; and they have provided the money for the works to pay, like other manufactories, rates upon assessed value. There is no crime in this that the consumers should be further penalized by having profit filched from them that they alone have created. Where is the logic or the reason in making the gas consumers pay more towards the town's financial obligations than those residents or factory owners who do not patronize the gas undertaking? Why should the factory owner using electricity or producer or suction gas be relieved from the gas profits of one tittle of his fair share of the rates, or be relieved from the same source of his proportion of the expense of lighting the streets?

While upon this subject, there is another point that may be raised. We are a little bit doubtful—but are, of course, subject to correction—as to whether the Corporation are not acting *ultra vires* in making the public lighting a charge on the undertaking. The Corporation Act of 1886 is not conveniently at hand; but, according to the souvenir, "the "profits which may be used for assisting the rates were [in "that Act] limited to 6 per cent. on the amount of borrowed "capital, out of which sum the interest and redemption fund "charges have to be paid." According to a digest of the Act published in our pages in 1886, the Corporation are forbidden to make out of their gas undertaking "a greater "profit than the annual amount of the annuities created for "the purchase of the undertaking," and 6 per cent. upon the capital outlay of £128,910, upon the capitalized profits of £75,436, and upon the new capital to be raised under the Act. The term "profits" is interpreted to mean the profit made by the Corporation out of their undertaking, after paying all expenses of manufacture and distribution, rents, rates, and taxes, management expenses, repairs and maintenance, law expenses, and bad debts, but not including any allowance for depreciation. From this it looks very much as though, making the public lighting and the lighting of the municipal buildings a charge on the gas undertaking, is an evasion of the "profit" limitation imposed by the 1886 Act. If there were not this charge on the undertaking for public lighting and municipal buildings, there would be a larger balance, under present conditions, for disposal in the interests of the gas consumers, after appropriating the money for annuity needs and the 6 per cent., as specified. We plead for equity. If the transference of money to the relief of the rates were discontinued, if all ratepayers contributed their proportionate share of the expense of the public lighting service, if evitable and useless enrichment of the gas supplied were discarded, Oldham gas would be of the cheapest in the country—not so cheap as Widnes or Sheffield, but the average price would rank closer to them. A convenience like gas ought to be supplied at the lowest possible figure, so that it can be used with freedom—in this way advantaging the industrial interests of the town, putting a clean and cheap servant at the command of every householder, and so contributing to a larger extent than it is doing at present to the purification of the atmosphere by the displacement of solid fuel.

Peripatetic Photometry Redivivus.

A PARAGRAPH occupying the final position in the news columns of last week's issue, does not, to the watcher of events in the gas industry, lose anything in interest and importance by the position accidentally assigned to it. It appears that some enthusiastic soul, forgetful of the events of 1900, has dragged forth from the County Council lumber-shed the old dishonoured portable photometer, and has incited the Public Control Committee into a little back-door action against the South Suburban Gas Company. If the revival cannot be attributed to forgetfulness, then there must be a little latent unforgiveness somewhere in County Council officialdom. Ordinary minded men may be pardoned for having thought that the drubbing received by those responsible for the County Council Bill of 1900 (which proposed *inter alia* to legalize portable photometry, and bring about the infliction of penalties for deficient results obtained by hole-in-the-corner testing of gas), and the disclosure at the time to Parliament of the incapacity of the portable photometer to do justice, would have made a life-long impression. It is apparent, however, that the liking continues for attempting to provoke agitation on the testimony of dishonest, incomparable, and disuniform conditions, and for insinuating, though not courageously declaring, fraud and double-dealing on the part of the Gas Company? Why, if there is a conscientious belief in the honesty and fairness of the portable photometer tests, there is not a deliberate charge of fraud and double-dealing, we cannot understand; for it would give an opportunity for the official libel to be fought out in a proper and straightforward manner.

The revival of peripatetic testing has been made, as said, in the South Suburban Gas Company's area; and the report that the Public Control Committee of the County Council have caused to be published asserts that the gas vended by the Company has been over a certain period below the standard prescribed in their parliamentary contract. The Public

Control Committee have not only published the statement in their report, but they have, emulating the meddlesomeness that characterized the conduct of affairs during the old Progressive *régime*, communicated the "facts" to the Lewisham and Lambeth Borough Councils, and have also informed the Educational Committee of the County Council of the result. In 1900, tests made in Board Schools and such-like places were produced in Parliament in support of the proposal that a House of Commons Committee (after a patient hearing of the compound of plausibility that the Council's representatives had carefully prepared for them, and the destructive evidence of the Gas Company's experts) rejected in a manner that sent away very crestfallen those who had conspired to put the Companies under every greater tyranny. These tests in the South Suburban district have also been made in Board schools—places which, like the instrument employed, do not come up to the standard testing conditions considered just and honourable by Parliament, and defined, under the authority of Parliament, by the Gas Referees. The tests were made during the fortnight ending Oct. 31. The highest result, from tests made on seven different occasions, was 14·24 candles, on Oct. 29 and 30; and the lowest result, 12·67 candles, on Oct. 26. The average of seven sets of testings was equal to 13·29 candles, or 0·75 candle below the standard. Now, we put it to the Public Control Committee and to the officials responsible whether the report would not have savoured less of vindictiveness and of suggestion of a fraud upon the public, if there had been included in it for the days named the results of the official tests under the prescribed standard conditions? On Oct. 29 and 30, the tests at the testing-station at the works, it is found on inquiry, gave returns respectively of 14·67 and 14·99 candles, and at the Beckenham testing-station 14·54 and 14·66 candles; while on Oct. 26, the works' testing-station returned 14·34 candles, and Beckenham 14·44 candles. The mean of the whole of the works' tests for the fortnight was 14·55 candles, and of the Beckenham tests 14·51 candles. For some time, official tests have confirmed the works' tests. We want to know, in face of these statutory testings, what excuse can be made by the Public Control Committee of the County Council or the officials for this renewed endeavour to defame the gas supplied and those who supply it, on tests that were not made in accordance with the prescription of the statutory authorities?

Regulations of the Coal Mines (Eight Hours) Bill.

The Coal Mines (Eight Hours) Bill, as amended by Standing Committee C, has been printed and published; and it is therefore possible to see exactly how matters are shaped at the present. How they are presented at the moment, however, is not necessarily how they will appear after the measure has received its final handling by the House of Commons; and thereafter the House of Lords will be having their turn. We know that the Home Secretary (it may have merely been in the heat generated by rebuff) flatly told the Standing Committee who considered the Bill that the Government would only be prepared to treat their amendments as advisory, and nothing more, and that some of them certainly would not be accepted. There will thus, in all likelihood, be other changes, but only it may be imagined in the direction of an extension of the time-limit before we get down to the concrete eight-hour day, inasmuch as the Government are not anxious to have the brunt of the effects of the Bill falling upon them this side of the next appeal to the country.

As matters stand at the moment, the Act is to come into force on July 1 next; and after that date a workman (other than those specifically excluded) is not to be below ground for the purposes of his work, and of going to and from his work, for more than eight hours during any consecutive twenty-four. The regulation applying to this, during the first three years, is that the eight hours may be calculated from the time at which the last workman in a shift leaves the surface and the first workman in the shift returns to the surface. Subsequent to the three years, the eight hours is only to be reckoned from the time the first workman in the shift leaves the surface and the first workman in the shift returns to the surface, and from the time the last workman leaves the surface and the last workman returns to the surface. From which it will be seen that the time in which the miner can, voluntarily or obligatorily, put forward his skill as a producer will be limited and curtailed, if the Bill passes, after July 1 next, and be further contracted after the three years.

It is quite plain that if the Bill receives the Royal Assent it will soon be very fruitful of trouble in the coal-mining industry. It will impose a considerable addition to the duties and responsibilities of the coalowner, agent, or manager; only the strictest discipline and co-operation on the part of the men will enable the Act to be carried out without friction and worry; it will certainly put a power in the hands of the miners that will not make any happier the lot of those in authority over them; and it is not beyond one's power of conception to see how the measure could be made the highway of collusive vindictiveness on the part of rebellious men, or men with a grievance, fancied or otherwise. The coalowner and his servants will have to practise the scrupulous attention to the clock that Boniface finds necessary if he is to escape the penalties of a time infraction. Upon them will rest the responsibility of fixing times, making regulations, and the provision necessary for preventing any contravention of the Act. They are to appoint persons to direct at the pithead the operation of raising and lowering the men; and a register is to be kept of the times the men are lowered and raised. Here, however, we come across a provision in the measure the importance of which has not been fully appreciated; and that is the power of supervision over the masters that the men, in this matter, will have a right to exercise. We know that in certain Italian Gas-Works, the men's Unions keep a sort of spy over labour affairs generally; and his presence is tolerated solely for the sake of peace. He is only there on sufferance; but under this Act a check by the miners over their employers is proposed to be granted as a matter of right. It may be said that it is only an extension of the power allowed to certain of the mine employees, under the Coal Mines Regulation Acts, to appoint a checkweigher, who has to be accorded all facilities for performing his duties. That functionary is an indispensable person in the avoidance of disputes; but it is an altogether different matter that is provided for under the Bill. The workmen in a mine may, at their own cost, appoint and station one or more persons at the pit head, at all times when workmen are being raised and lowered, for the purpose of observing and registering the times. This is a supervision of the control and conduct by the owners and the managers of one part of the operations of a mine; and while, where there is honest conduct, there can be no harm, it is highly objectionable to be policed by one's own servants in this way. A statutory extension of such a supervisory right to other industries would raise a violent storm of indignation throughout the country. However, there may be asurance that from this beginning will follow a spreading attempt on the part of industrial unions to obtain, in one way or another through workmen, a measure of legalized direct supervision; and any concession in this direction will make life for the master well-nigh intolerable. A statutorily controlled eight-hour day is not going to stop at coal mines—if the Bill succeeds; and any regulation now applied will hereafter be regarded as an adoptable precedent.

Other features of the Bill remain—such as the hour extension on sixty days in a year; and the King may, by an Order in Council, suspend the operation of the Act in the event of any national danger or emergency, or any grave economic disturbance due to the demand for coal exceeding the supply available. There are exemptions from the eight-hour restriction of certain men whose duties are of a special character; but their hours, during the three years after the passing of the Act, are not to be more than nine-and-a-half, and thereafter nine hours. There is a mass of regulation here—main and consequential—that affects the freedom of both master and man; and there never was any restriction of freedom or of hours of labour that did not cost someone something. In this case, too, notwithstanding the feigned or real complacency of the Home Secretary and Government, the regulation is going to cost money. The payers will be householders and industry in common. Householders have burdens enough to bear already. British industry has to compete against tariff-protected countries; and at home all possible is being done to fetter movements in that competition. Is this right?

The Lessons of Applied Statistics.

There is a class of people—pessimists they are commonly called—who are for ever making comparison between their native land and other countries, always derogatory of their own. Mr. W. M. Mordey, the new President of the Institution of Electrical Engineers, is not one of them. There is

about him a cheerful patriotism; and in him the homeland has a champion of no mean worth. From his presidential deliverance, we find that he will not have it that, in matters electrical at any rate, we are in this country a whit behind other countries; and he hurls statistics and deductions at the whining crowd of depreciators, and challenges them to support their accusations in similar manner. Whether we are behind or in front of other countries all depends on the point of view. In respect of electrical invention, the facts are too hard to say that we are in the van; in respect of application, we are by no means relatively in the rear, if we except America; in respect of finance, investment in this country has not been so profitable as in other countries, and the net percentage earned on the capital employed is on the wane. There we have three distinct aspects of the question that would bear discriminatory analysis at the hands of a capable electrical engineer and man of affairs with the necessary spare time at disposal. Mr. Mordey tells us the electricity generating plant installed in this country per head of population is more than twice as great as it is in Germany; that the number of units employed per consumer is greater; that the average price per unit is much less; and that the total costs are generally somewhat lower. These are the President's connotations from his statistical compilations; but whether he has given his inferences sufficient foundation by taking a limited number of towns in this country and in Germany, and working out the respective averages, will be questioned. The cynics have given faint applause to Mr. Mordey—because he is the President and a popular man. But the drooping returns on the capital invested in the electrical industry, the difficulty of finding capital, the depression that generally overclouds the electrical manufactories, the absence of exhilarating rays of sunshine on the horizon, and all the other adverse conditions that undoubtedly exist in this country, have been accumulated to mountain heights by the cynically disposed, so as to give a reverse side to the picture of presidential optimism.

The gross profits of German electricity undertakings abroad are shown by Mr. Mordey to be larger than they are in this country; and it is almost staggering to find in one electrical quarter that the difference is partly attributed to the influence of the lower prices that rule here for gas. It would not harm electricians to pause for a while on the facts: That electricity has not forced down the price of gas in Germany, and gas has not brought down the price of electricity; that both are making good profits in Germany, though electricity has not had for its various purposes such extensive application there as in this country; and that the further the application of electricity extends in this country at close-cropped prices, the smaller becomes the return on the capital investment. These facts are matters for the consideration of the electricity industry, and not particularly for us. But, in passing, it is certainly an interesting confession of one commentator that the low price of gas in this country has had a positive effect on the problem. It has generally been held in the realm of electricity that it has been the newer agent that has brought down the price of gas, and not expanding business, improved application, and the assistance of science in realizing a greater product from the raw material employed. We may plead guilty to a fair amount of commercial activity in the gas industry; but nevertheless the little vanity possessed by those who take a working part in it will be distinctly touched by the acknowledgment that that activity has had its advantages for the patrons of electricity undertakings in securing for them lower prices.

In one of his tables, Mr. Mordey advances some figures as to the use of electricity and revenue derived per head of the population in the County of London, in which the population is 4,685,000. The total number of units sold per head (lighting and power) is 37·3; and the total revenue per head is 9s. The calculations suggest the working out of the corresponding figures for gas. Taking the three London Gas Companies, and using the population of the County of London as being representative of the population in their combined areas, it is found that the total quantity of gas sold by the three concerns in 1907 was 37,723,092,000 cubic feet; so that the consumption per head was 8198 cubic feet. The total revenue from all sources was equal to £1 8s. 11½d. per head of the population; and for gas alone (ignoring meter and stove rental, residuals, and various miscellaneous receipts) £1 0s. 6¾d. From which Mr. Mordey will concede that the London electricity supply undertakings have a long lane to travel to arrive at parity.

Co-Partnership for Croydon.

This year will be notable in the annals of the gas industry for the extension in it of co-partnership. Those undertakings that have already enrolled themselves under the banner will give hearty welcome to the announcement that the Directors of the Croydon Gas Company last Friday decided to adopt the scheme, and are calling a meeting of the men at which the proposals will be fully explained and offered for acceptance. The workmen of the Company have always had warm sympathizers in the Chairman (Mr. Charles Hussey, J.P.) and the other members of the Board, and in the Engineer and General Manager (Mr. James W. Helps), his colleague the Secretary (Mr. W. W. Topley), and the other members of the staff. We know of nothing, in fact, short of co-partnership, that the Company could have done more than they have to make happy the lot of their men. But the men are now to be given the opportunity of becoming partners in the undertaking that gives them employment, and so property owners. The new development does not create any surprise, in view of the excellent relationships between the employers and employed, and in view also of the facts that Mr. Corbet Woodall, and Mr. William Cash are on the Board, and Mr. Helps is the chief executive officer. Mr. Woodall's advocacy of the co-partnership scheme in connection with the Tottenham and Edmonton Company and his address on the subject to the men, are fresh in memory; that he and Mr. Cash are associated (as, respectively, Director and Secretary) with the Bournemouth Company, who have lately adopted the scheme, is known to our readers; and Mr. Helps has not hidden under a bushel the fact that his critical examination of the fruits of co-partnership has hardened his convictions in its favour. The British gas industry is leading the way in showing the industries not only of this country but of the world the most philosophic and permanent mode of dealing with labour. It is not out of place to mention here that the Labour Co-Partnership Association are holding their annual meeting to-day, when the President (the Right Hon. A. J. Balfour, M.P.) will deliver an address. The chair will be taken by Mr. D. J. Shackleton, M.P., Chairman of the Parliamentary Committee of the Trade Union Congress. Among the speakers will be Sir Christopher Furness, M.P., who has introduced co-partnership into the shipbuilding industry. From these names it will be seen that the Association and its work are conducted purely on non-political lines. That is as it should be. We have always claimed the co-partnership movement as a national, industrial, and social one, and nothing whatever to do with party. Several gentlemen connected with Co-Partnership Gas Companies have announced their intention of being present at the meeting to-day.

Rating Statistics.

The return with which, at about this time of the year, we are accustomed to be favoured by Mr. James Carter, the Borough Treasurer of Preston—giving statistics with regard to the rates, &c., levied in various towns—has once more reached us; and the salient points are noticed in another part of to-day's issue. As each fresh issue comes along, it is generally found that some addition has been made to the number of towns included. On the present occasion, the total has reached ninety-one; and as the places from which returns are published embrace those having both large and moderate-sized populations, the list may be considered as fairly representative of the conditions prevailing over the country with regard to the matters dealt with—*i.e.*, rating, charges for gas, water, and electricity, and the profits or losses derived from "reproductive" undertakings. What change there is in the returns for 1908-9 as compared with those for the immediately preceding twelve months, is mainly of a favourable character so far as the citizens of the particular places referred to are concerned. With reference to the amount in the pound which is levied for rates, the two Hams are this time forced to forego the first place (which they have lately alternately occupied), in favour of Norwich, whose rates are stated to amount to 9s. 10d. in the pound. East Ham figures at 9s. 3d., and West Ham at 9s. 2d. —a considerable reduction in both cases on the calls recently made upon the ratepayers' pockets. There are four other places where the rates are 9s. in the pound, which is, again, a better showing than that of the previous year. The number of cases, also, in which the rates amount to 8s. in the pound or more is 24 on the present occasion, as against 25 and 29 for the two immediately preceding years; so altogether there is good evidence

of improvement in this direction. At the bottom of the scale, there are again the same three towns—Bournemouth, Lancaster, and Oxford—where the rates are 5s. or less in the pound; and in spite of this, in the first-named case, there were losses on estates owned and from "other sources" which increased the rates to the extent of 1d. in the pound. The list includes fifteen places where the price of gas is 2s. or under per 1000 cubic feet, for domestic purposes, as against thirteen last year—Widnes, as usual, occupying first place in regard to cheapness, with a charge of 1s. 2d. per 1000 cubic feet for domestic purposes, and still lower rates to large consumers and to users of power. For a domestic supply of electricity, two places charge 6d. per B.T.U.; while in Liverpool the average price is 3d., and in West Ham there is a flat-rate of 3d. Twelve of the towns named by Mr. Carter "relieve the rates" to the extent of 1s. or more in the pound in consequence of the "rents of property and profits transferred from gas, water, markets, &c.;" but it is only fair to mention that numerous instances are quoted of losses on municipal undertakings which have caused the rates to be increased—in three cases by over 1s. in the pound.

London Juniors' Short Paper Evening.

A paper that is calculated to induce the members to give expression to their views on any particular subject, is usually the *desideratum* of a Gas Association; but, of course, some matters are much more generally discussable than others—that is to say, questions of opinion are of necessity a great deal more likely to lead to a lively debate than questions of fact. This is no doubt the explanation of the difference in the extent of the discussions which took place on the two communications that were submitted at last Friday's "short paper" meeting of the London and Southern District Junior Gas Association. Both contributions were, however, on subjects which are of the very first importance to different sections of the members; and each was therefore of equal value as an addition to the transactions of the Association. The first paper—by the President, Mr. W. J. Liberty—pointed out the necessity for companies and corporations to diligently cultivate the gas-fire branch of the business, and expressed the opinion that if a cheap rotary meter could be attached to these appliances, by means of which a good discount could be allowed, and consumers would be enabled to see the amount they were burning, this would aid in the placing of many fires. Gas fires and cookers are a subject on which the Association are particularly strong, many of the members being in the "outside department," and thus having to deal with them in the course of their daily work. The discussion therefore was a good one; and it only ceased at the point it did in consequence of the exigencies of time. In his contention that there should be a rebate to gas-fire users, it will be noted, the President was supported by most of the speakers, who recognized that under existing circumstances the best possible progress was not being made in the development of the heating side of the gas industry. The second paper, which was by Mr. J. Hewett, was designed to emphasize the need for the continuous exercise of care and watchfulness in the carrying out of testing work. Though brief, it was to the point, and amply proved the author's argument as to the absolute necessity for attention to small things—if in chemical matters any point can really be considered "small"—and the danger of taking anything for granted.

Construing the New Workmen's Compensation Act.

After the passing of the first Workmen's Compensation Act, the Courts were for some years kept more or less busy construing the various terms and provisions contained therein; and it was only natural to expect that the opinions of the Higher Courts would have to be many times sought before the meaning of the different sections of the new Act could be regarded as fairly free from doubt. Section 4 was last week the subject of an appeal, under a set of circumstances which might easily arise again elsewhere at some future time; and therefore the conclusion arrived at is not without importance to local authorities. On a piece of land belonging to the Bradford Corporation, and adjoining their markets, were the ruins of an old mill, which they were desirous of having removed so that the land could be sold or the markets extended. A man named Todd made an offer, which was accepted, to pull the mill down and remove the bricks and rubbish; a payment to the Corporation being made by him of £15. In the course of the work of demolition, one of the men fell and was killed; and his widow claimed compensation both against Todd and the Corporation. The County Court Judge held that the man was in the employment of Todd, who was liable to pay the compensation (agreed at £185); and he further found that, under section 4 of the Act, read with the definition clause in section 13, the Corporation were also liable to pay the compensation. Todd paid; but the Corporation appealed—unsuccessfully. In giving judgment, the Master of the Rolls said it was argued on behalf of the claimant, and the County Court Judge adopted the view, that under section 4, taken with the interpretation clause, this was work which the Corporation as principals undertook in the execution of their duties, and for that purpose employed Todd as contractor. The primary intention of the contract was not a sale of goods, but that the ground should be cleared; and this was work undertaken on behalf of the Corporation. It had been said that the work was not done by the Corporation in "the exercise and performance of their powers and duties;" but he thought that, when a Corporation having power to do or not to do a thing, determined to do it, the matter came within the words of the section. The Master of the Rolls, however, was careful to point out that he had intentionally avoided dealing with the case of a private trader, in which there might be more difficulty.

Payment of Labour Members Out of Trade Union Funds.

The decision of the Court of Appeal last Saturday in an application made by Mr. Osborne, the Secretary of the Walthamstow branch of the Amalgamated Society of Railway Servants, for an injunction to restrain the Society from spending money for any objects other than those mentioned in the Trade Union Act of 1876, has fallen like a bombshell among the Labour Members of Parliament. The point raised was whether the Society was entitled to ally itself to, and use its funds in support of, the Labour Party, whose objects and policy, as Mr. Osborne contended, lead to Socialism. The application was originally made to Mr. Justice Neville, who held, following a previous decision, that Trade Unions were perfectly entitled to do as the Society had done. Assuming that they had the right to spend their money in obtaining representation in Parliament, it was purely a question of policy as to how they spent it—whether upon a Labour-Socialist or a Unionist party; and with this question he said the Court did not concern itself. Against this decision Mr. Osborne appealed; and obtained a unanimous judgment in his favour, with costs against the defendants. The Master of the Rolls expressed the opinion that it was not competent for a Trade Union to provide for parliamentary representation by means of a compulsory levy upon the members. Lord Justice Fletcher Moulton thought that such representation was not one of the objects of Trade Unions as defined in the Act of 1871, nor, in his opinion, was it contained in the Act passed five years later; and therefore it could not legally be made an object of such Unions. Lord Justice Farwell delivered judgment to the same effect. This unanimity evidently staggered the respondents; for their Counsel —Mr. Peterson, K.C.—asked for a suspension of the injunction, which directly affects the salaries paid to Labour Members (£200 a year), pending an appeal to the House of Lords. But it was refused—Lord Justice Farwell remarking, somewhat indignantly, that to grant the application would only be sanctioning the spending of money which the Court had already declared had been used for illegal purposes. Notwithstanding the refusal of the Court, several of the Labour leaders, and even, it is stated, the plaintiff himself, believe the case will still be carried to the House of Lords. Meanwhile, the effect of the present decision is to compel the Labour party to raise funds for the support of their parliamentary representatives through some other channel than Trade Unions. Should the Upper House—the "abode of wisdom," according to Mr. Keir Hardie—uphold the decision of the Court of Appeal, the next step will be, he says, to get the law altered.

The Proposed Gas and Electricity Tax in Germany.—According to the Berlin Correspondent of "The Times," the debate upon the first reading of the Bills relating to the financial reforms proposed in Germany, in which is included the taxation of gas and electricity, was concluded in the Reichstag on Saturday, and the whole question has been referred to a Committee composed of 28 deputies. The debate extended over seven days, during which time scarcely anything was heard but destructive criticism of the Government's proposals.

GAS STOCK AND SHARE MARKET.

(For Stock and Share List, see p. 647.)

THE Stock Exchange had a very inactive period last week. It is true it was account week, and, as usual, the operations of the settlement restricted fresh business to a very considerable extent. But even then, after making due allowances, things were decidedly quiet. The dominating factor was the harassing protraction of the negotiations for a settlement of the Near Eastern difficulty, which gave rise to much uneasiness, and induced a disposition to await developments before shaping either way. The tendency grew rather worse as the week went on; and the close was flat. At the opening on Monday, things were very torpid, and, for lack of support, prices in general drooped—even Americans giving way. The tendency continued just as bad on Tuesday; and Consols fell $\frac{1}{8}$. On Wednesday, a cheerful note struck by Americans imparted a lighter tone for awhile; but the rumbling of thunder in the East soon silenced it. Apprehensiveness ruled on Thursday; and the day being a holiday in New York, no cheering word came thence. The dulness continued on Friday, and prices still shrank if they moved at all (for there was little doing beyond the conclusion of the settlement); but just before the close a Continental item of news seemed more favourable. The old anxiety was back again on Saturday, all departments were dull, and the Foreign Market particularly so. The Money Market had a much better time, owing to a good and sustained demand for short loans which effected a sharp rise in rates. Discount was firm at first, but easier later on. In the Gas Market, business was brisk and active in the earlier portion of the week, but fell quiet in the later part. The chief issue was much in evidence, and accounted for about half the aggregate of transactions. The tendency was very firm; and all changes in quotation were upward. In Gaslight and Coke issues, the ordinary was done steadily at from par to 101. In the secured issues, the maximum marked 89 and 89¼, the preference 106¼ and 107, and the debenture 86½. South Metropolitan was quiet and unchanged, marking 119½ to 120. The debenture changed hands at from 86 to 86¼. In Commercials, the 4 per cent. was done at 106½ free, the 3½ per cent. at from 103 to 104, and the debenture at 83 and 83⅞. Among the Suburban and Provincial group, transactions were marked in Alliance old at 17⅞ and 18, Bournemouth "B" at 16½ and 16⅞, Brentford old at 246 and 247, British at from 42⅝ special to 43, Lea Bridge at 120½ and 121, and West Ham at 106¾ free. In the Continental companies, Imperial was done at from 180¼ special to 182, Union at 108¾ and 109¼, and European part-paid at 17½. Among the undertakings of the remoter world, Cape Town debenture changed hands at 75, Monte Video at 11$\frac{13}{16}$, Primitiva at 6, ditto preference at 5$\frac{3}{32}$, River Plate at 13⅛ and 13¼, ditto debenture at 95, and San Paulo at from 14$\frac{1}{32}$ to 14⅛.

ELECTRICITY SUPPLY MEMORANDA.

Metallic Filament Lamp Reductions—And Why?—Illuminating Power Rating and the Span of Life—More Light, and Current Consumption—Worship of the Flame Arc—Imaginative Assertion—Opposing Practices.

THERE has been great joy over the repentance of one sinner; the sinner being the General Electric Company. They, with other makers, have been guilty (according to those who rejoice) of the wrong of keeping up the prices of metallic filament lamps to an extent that has been highly detrimental to the electricity supply industry; while those electrical engineers who have been watching the peaks toppling off their lighting loads, have been slow to condemn the makers for maintaining prices. There never was a time when more disparity in opinion existed on any electrical topic than there is to-day in the industry; and it is difficult—nay impossible—to take up a single subject, and say in regard to it "this is the universal opinion." There has been this unsettled opinion on the question of the advantage or otherwise of the metallic filament lamp to the electrical industry, and on the subject of the advantage of the maintenance of high prices, so as to retard the pace of adoption in place of carbon filament lamps. But those who thought the makers of the lamps were inflicting a great injury on the electricity industry by maintaining prices, have given vent to their joy on learning that the General Electric Company have reduced their charges for 100-130 volt lamps, using 28, 35, and 55 watts per hour, to 3s. 6d. each—representing a reduction of 6d. The 25-volt lamps of the same wattage are now listed at 2s. 6d.; while 50-55 volt lamps are to be 3s. The high-voltage lamps of 50-65 watts per hour have been reduced from the 6s. at which they have been standing to 4s. 9d.—that is to say, a concession of 1s. 3d. This means that the other makers will be forced into line. That is the latest piece of intelligence about metallic filaments; but the unkind part of it is that, while there is thanksgiving in some quarters, there are others who are disturbed over the prospect of the lower prices hastening the supersession of wasteful carbon filament lamps.

But no one seems quite clear as to why the General Electric Company have made this reduction in price just now—well after the lighting season has started, and when stocks have, we presume, been laid in for the winter season. The extent of the trading in the lamps does not appear to have called for the reduction. "Within the short space of eighteen months," runs the story of what some doubters will describe as a fabulous success, "millions of these lamps have been put on the market." There will be traders who will characterize, in uncomplimentary terms of common use and brevity, the action of the Company in making reductions while doing such a gigantic business. Millions—and at the high prices! Stay, perhaps the sales have in recent times been flagging; and competition has been cutting into the rate of progress. It is safe to declare that the Company did not lower prices without good and sufficient cause, which cause was not alone the disinterested one of serving the interests of the electric supply industry. However, there ought to be a saving now in the cost of Osram lamp production, seeing that manufacture has already been commenced in this country, and an output of 15,000 a day is provided for by the Company. This being so, we would suggest to them that they should put the illuminating power ratings of the lamps in terms of the British standard candle, and leave the Hefner unit the exclusive property of our friends in Germany. Anyway it would look better, even if it diminished a little the reputed efficiency. If the Company do not find suggestion wearisome, we would also urge upon them the practice of a little more explicitness on their part in making statements. It is asserted by them that "various independent tests have been published showing a life varying from 1500 to 6000 hours, with a loss of candle power not exceeding 5 to 10 per cent." It will be observed that the expression is employed "shows a life"—not a working life. The figures are about right if the period from installation to abandonment is reckoned. But there is nothing about these figures that can be accepted as in any way representing average working life. Those who have had considerable experience of the lamps are satisfied that they are not far out in calculating their renewal expenses on the basis of an average 750 hours' working life—that is, for lamps that are installed without mishap.

One other point attaching to this reduction of price. Time was when these metallic filament lamps had to be used in pairs on 200-250 voltage systems, unless transformers were employed. The circumstance was one for which the central station engineer was profoundly grateful, for it assisted in maintaining his lighting load. The consumer at the outset got much more light but not a reduction of his account, as the coupling-up of two metallic filaments where one 16-candle carbon filament existed before about compensated matters. Then came the transformers which allowed a considerable reduction in the consumption of current by the use of lamps singly. Following on have been the production of the 50-candle lamp for 200 or so voltages. This lamp, it is asserted, is becoming very popular; and as it takes the place of the old 16-candle power carbon filament lamp, there is (declares one writer who wants, out of sheer mercy, to put heart into the central station engineer) no practical decrease in consumption. The electricity consumer is a happy-go-lucky sort of fellow. Before the coming of the metallic filament lamps, he was told it was very wrong to torture the eyes by using light sources of great intensity. He struggled manfully on, straining his eyes in the struggle. Then came the metallic filament lamp; and in those places where they had encouragement by a little pat on the back, the consumers jumped from carbon filaments to the metallic variety with the greatest alacrity—being told that a mistake had been made, and that what was really wanted was more light. The consumer had no reason to disbelieve the statement—indeed, says a writer in bidding the central station engineer to be of good cheer, "the experience of the gas companies with the incandescent mantle is, in fact, being repeated in this connection!" If the experience is repeated, it will be that of loss to the electricity station; for gas companies suffered through the incandescent mantle a reduced consumption for lighting purposes, while the consumer gained a high illuminating power, and a reduced account, which account the use of gas for cooking and heating has helped to build up again. The gas consumer makes one incandescent light answer where two or three flat-flame gas-burners were used before; and many an electricity consumer will make one 50-candle metallic filament answer, and with advantage, where three or four carbon filaments were formerly in use. When one is suffering a common complaint, kindly disposed friends prescribe a hundred-and-one remedies. Now that the electricity industry are suffering a falling off of consumption through the metallic filament lamp, kind friends are free with their advice to the central station engineer as to how to manage his business. Says the latest one, "Hurry up the heating and power load." We can see the station engineer in residential Suburbia who finds it difficult to hurry up anything, scratching his head over the well-meant advice, and wondering how many sillies he has in the locality who will use unit-per-hour radiators with a very modest amount of heat to radiate, and how he is to get power consumers where no factories exist. Never mind, if one engages in fishing without getting a bite, it may—we do not say will—keep one from getting despondent.

It was as recently as the "JOURNAL" issued on Nov. 3 that consideration was given to an article by Mr. E. E. Hoadley, the Electrical Engineer of Maidstone, in which that gentleman, with a disinterestedness and frankness that deserve a special mark, pointed out certain of the shortcomings of the flame arc lamp. Some of these shortcomings had been found by prior experience as well as by investigation of the lamps on view at the Manchester Electrical Exhibition, about which, in passing, it may be noted everybody has dropped talking as though it had never been held. Immediately after the reference to Mr. Hoadley's

article, the "Industrial Supplement" of the "Electrician" was devoted to the subject of flame arcs; and we have to acknowledge the grand magnanimity of the Editor in condescending to say that "gas lighting may be useful enough in its way, but it is neither so effective nor as cheap as flame arc illumination." Well, it is a pleasant thing to be "useful enough in a way," especially when we know that that usefulness is accompanied by an efficiency and an economy that have not been excelled, excepting in the fancy of those who indulge in false hypotheses, which are most unsubstantial supports of sound faith. Imagination may, however, be very useful to some writers; we prefer honest fact.

It is asserted that "the flame arc needs but one good installation in a town to recommend it. The other tradesmen immediately see the advertising value of a good lamp giving out a light peculiar to electric arc lamps, and not obtainable with gas, and an immediate effect is a run on flame arcs." There is excuse for a little inquisitiveness to know the neighbourhood in which this manifestly limited and peculiar experience has been obtained. How station engineers not far removed from the busy thoroughfares of Central London wish the declaration were true, though flame arcs are the worst means of exterior illumination for shop windows that can be obtained. Let us take, as examples, three separate main shopping thoroughfares in distinct suburbs. In one there are about sixty shops. A range of half-a-dozen small shops have between them eight flame arcs suspended in series. These lamps are being run under a contract. There is not another shop in the street—save a public house—boasting a flame arc lamp. Take another main thoroughfare in which there are about eighty shops, and this along a tramway route. About three years ago one shopkeeper was tempted, on special terms, to have an installation of flame arcs. In the three years, the "run on flame arcs" is represented by two other tradesmen, who followed hard on the heels of the first man. The remaining tradesmen have profited by the experience of their fellows, and are quite staunch gas consumers. Take another main street, in respect of which an estimate of a hundred shops will not be far wrong, one tradesman who is in the habit of calling a spade a spade was tempted to try flame arc lamps for a year at a fixed charge. At the end of the year, the verbal intimation was given him that the lamps could not be continued at the same price. His instructions for the removal of the lamps were given in terms that admitted of no parleying. There is only one other tradesman in that long thoroughfare with flame arcs. This is not surprising. The fact that tradesman No. 1 did not find in flame arcs the advertising value expected is now the common knowledge of that neighbourhood. In these three distinct neighbourhoods, the "immediate effect" of the first installation of flame arcs has not been to create that "run on" them that is suggested by our contemporary, many of whose readers will know of localities to which our assertions will apply.

From the survey made of the position of flame arc lamp manufacture, our contemporary arrives at the conclusion that the general standard of flame arc lamp construction has been raised all round—certain refinements have been embodied in lamps which make for longer life, fewer breakages of carbons, greater efficiency, and improved illumination. In reading the descriptions of the lamps, there is nothing sufficiently definite to show any striking advance. But we do see this, that what one manufacturer regards as good practice, others entirely scout. One maker uses clockwork in the lamps; another despises it. Sliding tubes, chains, and flexibles are considered by some to be an abomination; others use them. Shunt coils, dash-pots, and striking mechanisms are employed; another maker describes these as "complicated" arrangements, which are "frequently the cause of much trouble." A critical examination of the various constructions by an independent and fearless electrician with practical experience of them all might at the present time be helpful to the seeker for truth and the prospective purchaser. There is now in most of the lamps provision for the free access to the atmosphere of the fumes arising from the combustion of the carbons. These fumes will clog and ruin the strongest of mechanisms; and the necessity for their escape cuts from the lamps the field of interior illumination, except in extensive and well-ventilated places. But there is one peculiar looking lamp, which claims the title of "regenerative," and in which the chemical vapours rise through an up-shaft, pass down tubes, and reascend past the arc, so "intensifying it." This cycle of operations looks very beautiful as told on paper. And it may be all right; but we have our doubts. The production of the chemical vapour is continually going on. What becomes of it all? Is there no deposit on the globes or no clogging of the tubes? Several of the makers are now turning out magazine lamps; but there is not a great deal of praise for them. In one case, the writer of the description says the lamp "*appears* to bear out the claims of the makers for satisfactory working." The principal magazine lamps are made to run forty and fifty hours, without re-carboning. But taking the higher figure, on a lighting table of 4000 hours a year, the operation would have to be performed no less than eighty times a year; with the lower figure, a hundred times. One point more. "The distinguishing feature of most flame arc lamps on the market is that they utilize an arrangement in which the carbons are placed above the arc and converge downwards upon it." When remarking upon this, the writer of the articles says: "This method accounts for the *intense downward illumination*, which is always a feature of flame lighting." Curious that we should have long entertained the very same impression.

THE HIGH-PRESSURE INVERTED GAS-LAMP INSTALLATION FOR FLEET STREET.

Our readers will remember the consternation there was in the electrical world when the City Corporation, with the disinterestedness that comes from being merely buyers and not purveyors of artificial lighting agents, gave over certain of the arterial thoroughfares of the City to high-pressure gas lighting, through which act a number of electric arc lamps were at once displaced. But much has happened since then. The electrical people have wrestled hard with the problem of how to regain the confidence and the favour of the Corporation. They have to that end strung up some flickering, shadow-casting flame-arc lamps in Cannon Street, and have hoisted on high columns others in Holborn and thereabouts. Still the Corporation are not convinced that they have yet seen the best that can be done in the lighting of main thoroughfares; and the numerous failures of electricity there have been of late in different parts of the country and abroad may have reawakened uneasiness as to the policy of committing the nocturnal lighting of the City to a method of illumination that is so strangely erratic. Moreover, the City Fathers are not satisfied that the flame arc lamp is the best under the worst atmospherical conditions to which City streets are subjected. All this may be inferred from the fact that the Corporation have lately authorized the spending of £200 on a deputation to inspect the public lighting methods of Continental and other cities and towns.

In the evolution of efficiency and economy, incandescent gas lighting has not stood still. Good of its kind at the time of erection, the high-pressure lighting of Queen Victoria Street does not mark the zenith of present attainment. The Keith inverted 1500-candle power lamp (single mantle), as employed at the Franco-British Exhibition—burning only 25 cubic feet of gas an hour, and thus rendering an efficiency of about 60 candles per cubic foot of gas, supplied at a pressure of (say) 55 inches—has come along since then; and the Gaslight and Coke Company have, with the consent of the Corporation, taken steps to show them and the citizens the effect of these lamps for street illumination. As has been mentioned by us on various occasions, Fleet Street has been chosen for this demonstration; and through the day and night work of double gangs of men during the past twelve days or so, a 6-inch main has been laid about 2 feet deep along the whole centre of the thoroughfare, and the road surface replaced—the distance covered being between Ludgate Circus, and Essex Street, Strand. Near the latter, the Gaslight Company have their compressing plant station, supplying the high-pressure lamps in Aldwych and Kingsway. But during the laying of the Fleet Street main, the 10-inch high-pressure gas supply at Ludgate Circus has been used for testing, in order to see that a tight job has been made of the joints. However, it is from the existing compressing plant station for Aldwych and Kingsway that the high-pressure supply for Fleet Street will be taken. The compressing plant is to be duplicated. Each plant will be considerably above all claims that will be made upon it. In putting down additional plant, the Gaslight Company are looking well ahead. It will consist of two Keith-Blackman rotary compressors, each being capable of dealing with 8000 to 10,000 cubic feet per hour

at 60 inches pressure. The compressors are identical with those that were in use at the Franco-British Exhibition; and they will be fixed in an arch alongside the present compressing plant. Two 5½-horse power "National" gas-engines will be used to drive the compressors by means of shafting. The shafting will run on loose pulleys, so that either engine can drive either compressor. The duplicated plants will enable the Gaslight Company to meet considerable extensions in high-pressure gas lighting and heating, for either night or day load. If, however, the 6-inch main in Fleet Street is used for day load, some other form of controlling the lamps than that applied at the outset will have to be adopted; for, as at present arranged, the lighting, with the automatic lighters, will be accomplished by the increase of the pressure in the mains from normal to 60 inches—extinguishing being effected by reverse operation. Any alterations, however, to meet a change in conditions will not occasion any difficulty.

There will be sixteen of the lamps in the length of street to be illuminated; and from what has been said, it will have been gathered that the lighting and extinguishing will all be manipulated from the central compressing station. The sixteen lamps only consuming 25 cubic feet per hour each, the whole illumination of Fleet Street will be carried out on a consumption of merely 400 cubic feet of gas an hour, and the total illuminating power from the lamps will be about 24,000 candles. The average distance of each lamp will be appoximately 120 feet diagonal; and the illuminating power it is estimated will average about 16 candles per foot run, taking the entire length of Fleet Street. There will be thirteen of the lamps fixed on brackets attached to buildings; the design of the brackets being shown by the sketch. If lamp columns are objectionable in City streets, these brackets will be far preferable to the overhead wire system in Cannon Street. Three or four of the lamps will be on columns, and be suspended in harps of (as the drawing indicates) ornamental design. The brackets and harps will be constructed of steel barrel, with cast-iron ornamentation. From face to centre of lamp, the brackets will measure 4 ft. 6 in. They will be brought well into the footway, so as to be clear of all traffic. The average height from the pavement to the centre of mantle will be 16 feet. The automatic controlling device applied to these lamps is similar to that used on the lamps at the Franco-British Exhibition. It proved very satisfactory there; and having had six months' continuous use, there has been ample demonstration and proof. There will be, in the case of the Fleet Street lamps, a slight difference in the attachment to the lamp, which will afford access to the nipple without the necessity of taking the lamps apart or lowering them. Although, in the experience up to the present, it has not been found necessary to take the lamps down for cleaning the nipple, it is a contingency for which it is wise to provide. Before the end of this month, it is expected that Fleet Street will be illuminated by the new system; and it will then be the centre of much attraction for lighting engineers and street lighting authorities.

Mr. G. J. Whatley, one of the Assistants to Mr. Arthur F. Phillips, was successful in the recent examination for the admission of associate members to the Institution of Civil Engineers.

Mr. H. B. Wheatley has resigned the position of Assistant Secretary of the Society of Arts; and at the meeting of the Council on Monday last week, they passed a resolution recording their appreciation of the long and faithful services he had rendered to the Society since the year 1879.

Mr. Thomas Harris, who has for some time been with Messrs. Falk, Stadelmann, and Co., Limited, has just severed his connection with the firm, in order to take over the management of the United Chemical Works—manufacturers of the "Ino" mantle—in the place of Mr. Julius Norden, who has resigned.

Sir Alfred de Bock Porter, the Secretary and Financial Adviser to the Ecclesiastical Commissioners for England since 1880, died at New Barnet last Wednesday, at the age of 68. He was one of the members of the Royal Commission on the London Water Supply in 1897, and was knighted six years ago.

Mr. H. Major Morgan, J.P., the recently elected Mayor of Lichfield, is Chairman of the Lichfield Gas Company, and of the Conduit Lands Water Trust. His father, Mr. Major Butler Morgan, a surgeon, was Mayor in 1846; and he himself, who was for some years a medical practitioner in the city, succeeded to the office for the first time in 1879.

It will be seen from our "Legal Intelligence" that the case of *Davies v. Gaslight and Coke Company* was advanced a stage last Friday; the final hearing being fixed for Thursday, before Mr. Justice Warrington. On the same day, a case transferred from Mr. Justice Eve's Court will also be tried—an action by the Water-Works, Lighting, and Power Investment Corporation against the Brentford Gas Company.

Mr. Harry S. Best, of the Water Engineer's Department of the Plymouth Corporation, was recently presented with a handsome kit bag and travelling writing case by the engineering and clerical staff. The Water Engineer (Mr. F. Howarth, M.Inst.C.E.), in asking Mr. Best to accept these tokens of respect and goodwill from his colleagues, wished him every success in the important appointment he has obtained under the Rangoon Municipality, and said he felt sure he would serve them as faithfully as he had served the Plymouth Water Department during the past seven years.

PERSONAL.

At the recent annual general meeting of the Royal Scottish Society of Arts, Mr. W. R. Herring, M.Inst.C.E., of Edinburgh, was elected a Vice-President.

Mr. R. B. Johns has been elected a Director of the Plymouth Gas Company in place of the late Mr. G. Cox, whose death was recorded in the "Journal" for the 7th of July.

Mr. J. W. Buckley, who is leaving Devonport to take up his new post as Engineer and Manager of the Hornsey Gas-Works, entertained the staff and employees of the Devonport Gas-Works at a smoking concert on Friday evening. Mr. Sleeman, in proposing Mr. Buckley's health, spoke of the great improvements carried out by him during the time he had been Engineer. He referred particularly to the new retort-house now nearing completion, which would be of the greatest utility for years to come. The toast was received with musical honours. Mr. Buckley, in reply, expressed his appreciation of the manner in which he had been received, and thanked them for their kindly references to him. His success, he said, was due in a great measure to the way in which he had been assisted by his staff and workmen, and also to the support he had received from the Gas Committee.

Mr. W. P. Tervet, who is about to take up the duties of Gas Engineer and Manager to the Devonport Corporation, was last Thursday presented by the officers and employees of the Plymouth Gas-Works with a marble clock, a pair of bronzes, and a dressing case, as a mark of their esteem. Mr. P. S. Hoyte, the Engineer and Manager of the Plymouth Gas-Works, made the presentation, and said that while the entire staff were proud that one of their colleagues had obtained this promotion, they all regretted that he was leaving. During recent years, they had carried out very large extensions and alterations at the works; and in these Mr. Tervet had been his right-hand man. If he found at Devonport the spirit of co-operation which animated the staff at Plymouth, his success was assured. Mr. J. A. Richmond and Mr. J. Walters joined in the expressions of good-will, and said that Mr. Tervet left with the best wishes of all the employees of the Company. Mr. Tervet, in reply, acknowledged the kindness displayed towards him, and said that, though pleased at having secured the position at Devonport, he was extremely sorry to leave Plymouth.

THE MAKING OF ELECTRICITY DEFICITS.

The criticism that was made in the issue of the "Journal" for Oct. 20 (p. 185) on the accounts of the West Ham Electricity Department is, it appears, fully justified by the recent report of the Borough Treasurer. It will be remembered that we pointed out how the private lighting was increasing at tortoise-like rate, that heavy capital expenditure was just now being made entirely on account of the business in power electricity at finely-cut prices, and that the new business was smartly cutting-down the average revenue per unit, without a commensurate reduction in the average outgoings per unit. The Borough Treasurer points out that the capital expenditure last year was £37,316; and, in view of the almost stand-still condition of the lighting business, this is entirely expenditure necessitated by the power business. The peak-loads of this undertaking are now formed by the power demands at low prices; the lighting business supplying the valleys in the output curve. The Borough Treasurer has been looking into the question of how the deficits arise; and it is not a matter over which search has to be carried far or deep. He takes the figures of the past three years, finding that the comparative costs of production per unit sold have been: 1906, 1·09d.; 1907, 0·96d.; 1908, 0·83d. Capital charges: 1906, 0·86d.; 1907, 0·70d.; 1908, 0·60d. Total cost, including capital charges: 1906, 1·95d.; 1907, 1·66d.; 1908, 1·43d. The average price obtained per unit sold, based on total revenue, including revenue from works executed for consumers, &c.: 1906, 2·05d.; 1907, 1·60d.; 1908, 1·34d.—resulting in a surplus per unit of, 1906, 0·10d.; resulting in a deficit per unit of: 1907, 0·06d.; and 1908, 0·09d. It will be seen from the above that the costs have decreased considerably, but not sufficiently to cover the decrease in average revenue obtained per unit sold; the result on the year 1908 being a loss of 0·09d. per unit. Comparisons made between 1908—the first complete year of new prices—and 1906 (which period was the last before the revision of prices) show that, while the revenue per unit has been reduced 35 per cent., works costs have only been reduced 24 per cent., and the total costs 27 per cent.—representing 11 per cent. greater reduction in revenue per unit than in works costs, and 8 per cent. greater reduction in revenue than in total cost. These figures all go to bear out the argument advanced in these columns a fortnight ago. Among other interesting points to which the Borough Treasurer alludes is a comparison over the three years of the percentage of units sold to the units generated. The units sold in 1906 equalled 87·85 per cent.; 1907, 88·83 per cent.; 1908, 84·70 per cent. Used on works and lost in distribution: 1906, 12·15 per cent.; 1907, 11·17 per cent.; 1908, 15·30 per cent. There is thus an increase in units consumed on works and distribution of 3·15 per cent. in 1908 over 1906, which increase represents 1,211,610 units. It may be supposed there is no love lost between the Electrical Engineer and the Borough Treasurer of West Ham.

NEW GAS-WORKS FOR LOCHGELLY.

Opening Ceremony.

The Lochgelly Gas-Works, which have been undergoing reconstruction the past two years, were formally opened last Wednesday. The Company assembled at the house of the Manager, Mr. J. D. Keillor, where they were entertained by him and Mrs. Keillor, and afterwards made an inspection of the works, under his guidance. The scheme entailed the entire remodelling and enlarging of the works, for which two acres of additional ground were acquired; and the completed works cover an area fully three acres in extent, conveniently situated near the railway.

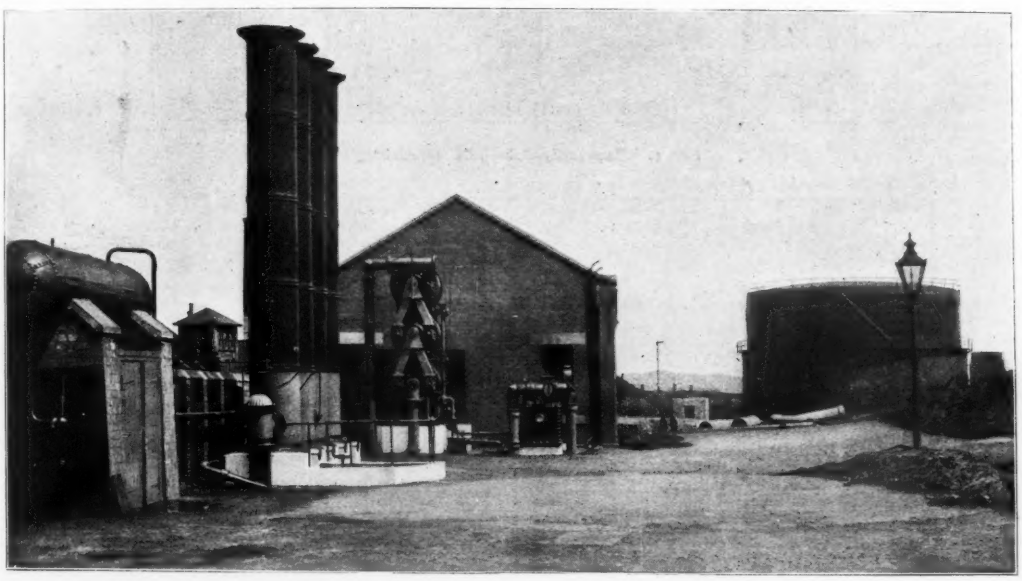
The new retort-house and coal-store is 94 feet long and 62 feet wide; and the coals are tipped through two high-level doorways. The retort-bench consists of four settings of six retorts each; and there is sufficient space for twice this number. The hydraulic main is in four sections, with separate seals, tar overflows, &c.; and there is a retort-house governor by Messrs. Parkinson and W. & B. Cowan. Adjoining the retort-house is a very compact mess-room, bathroom, &c., for the use of the men. The complete retort-house and coal-store, and the retort-bench, were erected by Messrs. Robert Dempster and Sons, of Elland.

The condensers, which are of the atmospheric type, and the Creeke scrubber and Livesey washer, were erected a few years ago by Messrs. H. Balfour and Co., of Leven; but they were removed and re-erected on a new site by Messrs. Dempster. The purifiers are housed in a substantial brick building 60 feet long and 40 feet wide, open on two sides. There are three boxes, 15 feet square and 5 feet deep, on Green's principle, with Weck centre-valve, also erected by Messrs. Dempster. Oxide of iron is used for purification purposes.

The new station meter, of 10,000 cubic feet per hour capacity, is by Messrs. Alder and Mackay; the 12-inch station governor (water loading) by Messrs. Parkinson and W. & B. Cowan; and the exhauster, which is of the same capacity as the station meter, and of the latest type, by Messrs. George Waller and Son. All this plant is housed in a neat building of terra-cotta brickwork, 50 feet long and 25 feet wide, furnished with a complete arrangement of pressure-gauges, &c.

The new gasholder was built by Messrs. Dempster. It has a capacity of 100,000 cubic feet, and is of the spiral-guided type, prepared for double lift. The tar and liquor pumps were supplied by Messrs. Joseph Evans and Sons, of Wolverhampton; and the Cornish steam-boiler, 16 ft. by 5 ft., by Mr. John Bryce, of Kirkcaldy. The connections throughout the works are 12-inch. The old lime-shed, 40 feet long and 18 feet wide, now serves as a workshop and store. The tank of a demolished gasholder, 31 feet in diameter and 10 feet deep, is used as a tar-well.

The works are now capable of producing 50 million cubic feet of gas per annum; but in every section provision has been made for future extensions, and 120 millions could be produced by merely adding to the manufacturing plant. The yard is tastefully laid out with numerous flower beds, &c., and compliments were paid to the workmen for their display and for their interest in the works. The Company are the possessors of the first and only system of high-pressure distribution in daily use in Scotland.



The Lochgelly New Gas-Works.

At the close of the inspection of the works, the Chairman of the Company (Mr. Robert Philp, J.P.), remarked that they had been designed and erected as thoroughly up-to-date as could be wished; and he thought they reflected very great credit upon Mr. Keillor, their Engineer and Manager, who had planned and carried through the entire scheme. Everything he had recommended had been attended by most excellent results. The Company was formed twenty-three years ago, with a capital of £1700. Two-and-a-half years since, the capital was £7000, and the annual make 8 million cubic feet. The capital was now £20,000; and the make this year would be fully 30 millions. Since Mr. Keillor took the management, the Company had made rapid strides; and an increase of 275 per cent. in the annual make of gas in two-and-a-half years was surely a record which few gas companies could show.

CORNISH GAS ENGINEERS' ASSOCIATION.

Visit to Messrs. Willey and Co.'s Works.

A number of members of the Cornish Gas Engineers' Association last Thursday paid a visit to the works of Messrs. Willey and Co., Limited, at Exeter.

The party, accompanied by the Chairman of the Company (Mr. F. Templer Depree, J.P.) and Messrs. Stephen Simpson, T. Glanfield, and H. Weslake, Directors, inspected all the departments, went through the offices where the draughtsmen were at work, saw the pattern makers, watched the molten metal run into the moulds, witnessed the interesting process of brass and iron founding, saw the power and fitting departments, and automatic riveting machines, shearing, bending and rolling steel, steam-hammer forging, &c., and inspected gasholders, purifiers, roofs, &c., in course of construction. Some time was spent in the automatic shop, where the meter parts are manufactured; and the various automatic and labour-saving machines in operation were found extremely interesting. The brass shop was seen, and the manufacture of gas-fittings, &c., was explained. The brazing, chemical treatment, and final stages of laquering (mostly done by girls) was also briefly inspected. The new meter-works were much admired; and the meter in all its various stages of manufacture was seen, and the automatic meter mechanism explained. The gas-stove department was next inspected, with all its many varieties of gas heating-stoves, cookers, and labour-saving appliances.

Mr. Depree subsequently presided at the tea to which the visitors were invited. He said it was one of the earliest trips they had taken as an Association, and he hoped it had proved of interest. The works, he thought, would compare favourably with any in the West of England—which some people considered out of the way—for the production of the necessities in the gas business. They occupied a fair position with regard to the industry generally. These Societies enabled them to meet each other, and to form friendships which were valuable, and frequently rubbed off the rough corners by which business of every kind to-day was marked. There were several difficulties connected with the trade; but the greatest was that of unemployment. His Company had been fortunate for some time past in having had a fair amount of employment for their workmen; but in most parts of the country the distress consequent upon it was very marked. Mr. S. J. Ingram (Truro) returned thanks for the cordial reception given the members. The birth of the Society, he said, was recent; but they had been able to accomplish successful work together. Not only had it been a great pleasure and privilege for them to visit these works, but from an educational standpoint it was of great advantage to them.

Mr. W. A. Padfield and Mr. H. Gadd also made a few remarks

ELECTRICALLY-DRIVEN PLANT IN GAS-WORKS.

THE current number of the "Electrical Review" contains some interesting particulars, supplied by the Berlin Correspondent of that publication, in regard to the electrically-driven coke-handling plant at the municipal gas-works at Görlitz, in Prussian Silesia. The installation comprises an extensive inside and outside lighting plant, covering the whole of the gas-works, in addition to a number of electric drives. We give below some extracts from the article, for which, as well as for the loan of the blocks with which to illustrate them, we are indebted to our contemporary.

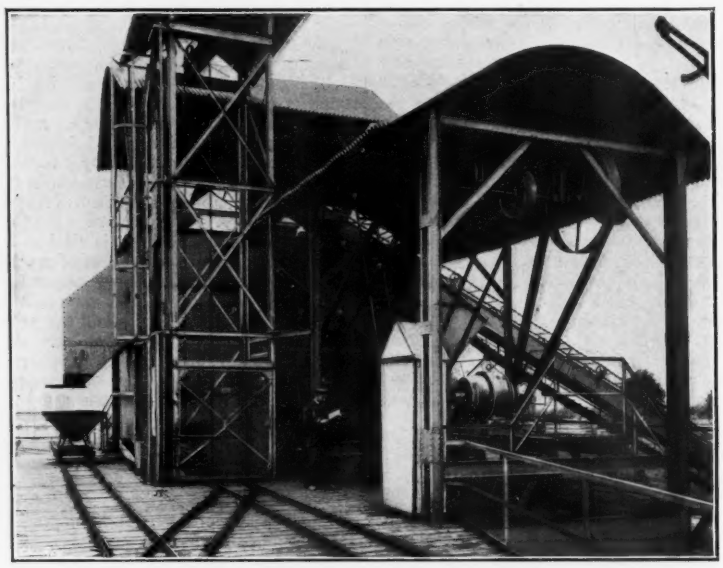


Fig. 1.—Electrically-Driven Coke-Crushing Plant.

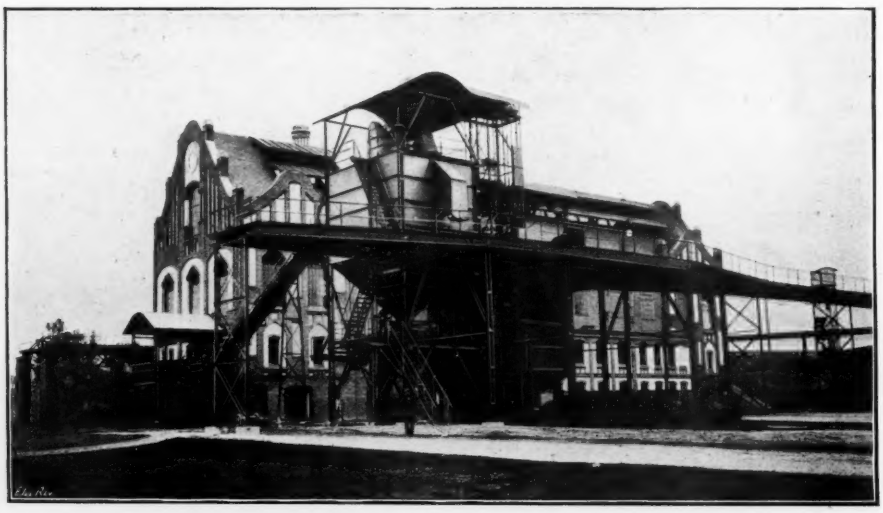


Fig. 2.—The Retort-House, Showing the Coke-Handling Plant in the Foreground.

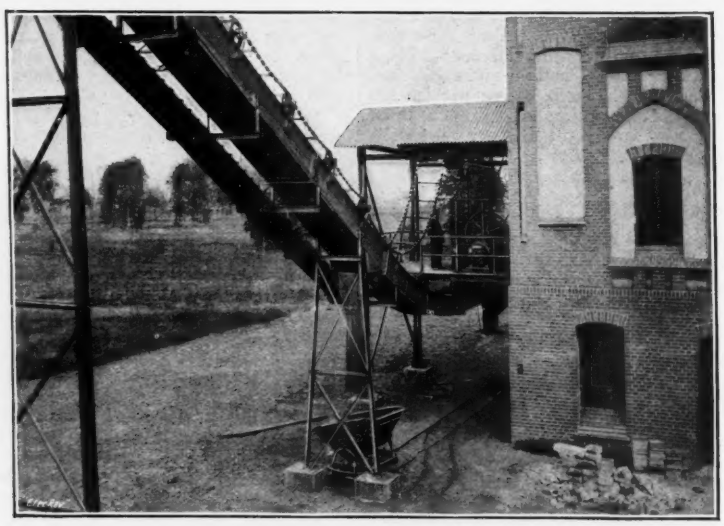


Fig. 3.—Coke-Shoot, with Electrical Drive.

The electric power station contains two horizontal tandem steam-engines, each of which has a normal output of 125-H.P., at 130 revolutions 1 per minute; a maximum permanent output of 60-H.P., and a temporary overload of 190-H.P. These are run condensing, and coupled to direct-current dynamos of 110 K.W. at 220 to 235 volts pressure. The boiler plant comprises four tubular boilers with a steam pressure of 12 kilos. per square centimetre.

The lighting plant comprises 125 incandescent and 20 arc lamps; the latter being arranged in five circuits of four each, as follows: Two arc lamps of 10 amperes each in both the engine and boiler rooms; four arc lamps of 10 amperes each in the coke yard; eight arc lamps of 8 amperes each in the retort-house; and one arc lamp of 10 amperes for the coal-dressing plant, railway embankment, gasholder, and power-house respectively.

Electric motors have been used most extensively for the operation of the various auxiliary machines, to an aggregate of upwards of 100-H.P. The most important drives, for each of which a special motor has been provided, have the following capacities: The coke elevating and conveying plant close to the retort-house, 18-H.P. (fig. 2); the coke-shoot in the retort-house, 6-H.P. (fig. 3); the coke-shoot of the coke breaking and sorting plant, 17-H.P. (fig. 1); the coke-sorting screen below the night storage hopper, 2-H.P. (fig. 4); the coke-shoot above this hopper, 5-H.P.; two coke elevators of 4-H.P. each; a high-pressure blower, 25-H.P.; a centrifugal tar-pump and an air-pump in the ammonia-room of 5-H.P. each, &c.

These motors, which are protected on the top by corrugated sheet-iron roofs, are of the entirely enclosed type (see figs. 2 to 4); the starter and switchgear of each of them being located in a sheet-metal cupboard, fitted with sliding doors. The motor driving the air-pump in the ammonia-room is likewise enclosed, whereas that employed for operating the tar centrifugal pump is surrounded by a ventilating housing—sufficient air being supplied through tubes.

Four main feeders branch off from the switchboard at the central station, two of which are intended for the lighting and two for the power supply. In addition to these, a number of auxiliary circuits have been provided, especially for the lighting of the power-house and for some smaller motors. The cables for the motors located in the neighbourhood of the retort-house—particularly those intended for the coke crushing and sorting plant, as well as the lighting conductors supplying the retort-house—have been arranged underground; and all the remaining conductors, in so far as they are situated outside the buildings, are fixed overhead.

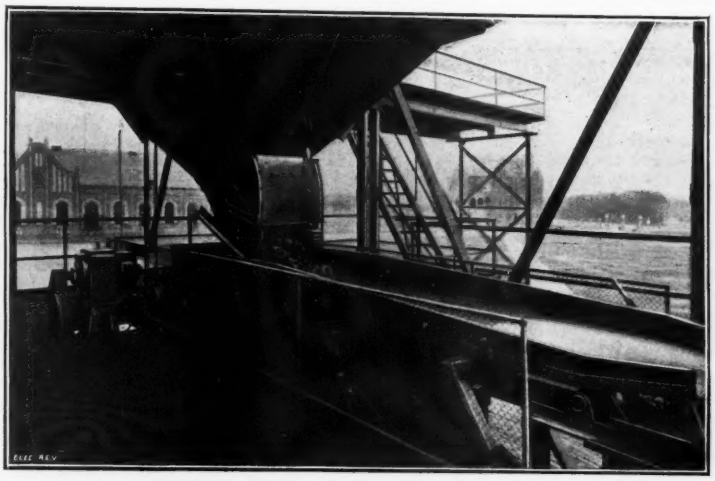
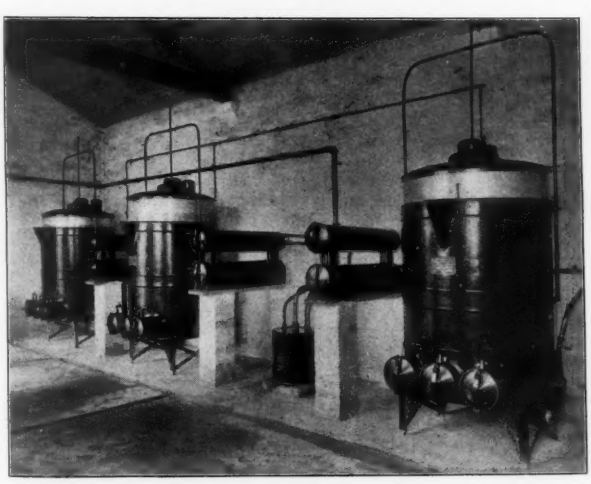


Fig. 4.—Coke-Screen with 2-H.P. Motor Drive.

ACETYLENE GAS FOR RAILWAY LIGHTING.



The Acetylene Generators at Brockenhurst Station.

WHAT, we understand, is the first really important railway station in this country to be completely and permanently lighted by acetylene, is at Brockenhurst, on the London and South-Western system—between Southampton and Bournemouth and Weymouth. The platforms, bridges, offices, refreshment rooms, and all signals are lighted with over 200 burners; the aggregate candle power amounting to, approximately, 9000. Three No. 7 "Incanto" generators—manufactured by the Thorn and Hoddle Acetylene Company, Limited—are used, of a capacity of 3 cwt. of calcium carbide at one charge. They yield, approximately, 1613 cubic feet of gas; and the piping aggregates 8000 feet. We are indebted to the "Railway News" for the following particulars of this interesting installation.

Brockenhurst Station was formerly lighted by a combination of oil-lamps and oil gas; and the substitution of the acetylene plant has made a material improvement in the lighting of the station premises. The plant consists of three gasholders, each of which has three generating chambers which, intermittently, make gas according to requirements; while the capacity of the plant is such that the lighting of the station can be maintained if only one generating chamber in each gasholder is charged—thus allowing full opportunity for re-charging the rest of the plant.

The gas is first water-washed, and then purified on the system which the Thorn and Hoddle Company have introduced; the result being a very clean gas of high illuminating power. The illustration shows the hydraulic connecter, the object of which is to prevent one gasholder feeding another, and thereby causing waste of gas. Separate control taps have been fitted in connection with the various sections, so that the lights can be turned low when not required. There are over 200 burners, varying from 5 to 50 candle power. The smallest burners are used for the signals. For the ground frame signals 10-candle power burners were originally employed; but these were found to give too bright a light for the purpose required, and 5-candle power burners have been substituted as being more easily distinguishable for signal lights. The total candle power employed—approximately 9000, as already indicated—is well within the capacity of the plant, which is capable of supplying 660 burners of 20-candle power for six hours.

A portion of the plant has been in service for some time; but the plant as a whole was only put in operation last month, and up to the present time has given very satisfactory results. No skilled labour is required. The generating chamber employed is so designed that the carbide and water only come into contact when gas is required for use; the necessary quantity of carbide being then completely decomposed. In this way the bulky and costly separate gasholder is dispensed with, while the cooling and washing of the gas are more effectually carried out. Other important advantages claimed for the system are the reduced risk of freezing in winter, ease in charging and removal of the residue, and much greater economy in first cost of the whole plant. In this connection, it may be pointed out that a well-known authority has shown that the illuminating power of acetylene falls off very considerably if it is kept stored in a gasholder over water for any length of time. The gas used in the Brockenhurst installation is delivered to the burners under 3½ inches of water pressure.

On the general subject, our contemporary adds, it may be pointed out that the steady reduction in the price of carbide, from £28 per ton in 1896 to £13 15s. per ton at the present time, has rendered it a much cheaper illuminant than formerly. This long fall in the price of carbide has been very gradual; and those in a position to judge believe that the price will in the near future go still lower. The present price is said to be equivalent to coal gas at 2s. 6d. per 1000 cubic feet, or electric light at 3d. per unit.

Key's Petrol Gas Turbine Generator.—In our "Register of Patents" in to-day's issue (p. 639) will be found an abstract of the patent specification of a petrol gas turbine generator, the manufacturers of which are the Centenary Air Gas Company, of 11, Queen Victoria Street, London, E.C., and Central Chambers, Glasgow. We understand that the Glasgow Rate and Salvage Association—an Association formed by the chief insurance offices to regulate the rates and generally look after their interests, and under whose jurisdiction is the Salvage Corps of the Glasgow City Fire Brigade—have carefully examined this apparatus at work, and have reported on its safety. They do not object to its use in inhabited buildings; and this without any increase in ordinary insurance rates. This is the only petrol-gas apparatus which has their approval; and should any other insurance company demur to its use in dwellings, the makers, through their insurance agent, are prepared to take over the risk at the lowest possible rates.

ROUND THE WORLD—AND SOME GAS-WORKS.

By MAURICE GRAHAM.

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XVI.—JAPAN: OSAKA.

WHEN one realizes that the population of Japan is nearly 50 million people, and that there are only 76 towns with a population of over 30,000, it is readily seen that agricultural pursuits claim the vast majority of the inhabitants; and as long as this remains, then a valuable asset of Japan will remain also. The rice fields claim this distributed labour at present, and will continue so to do until the industrial pursuits of the towns require labour for the mills, factories, and works in general.

OSAKA.

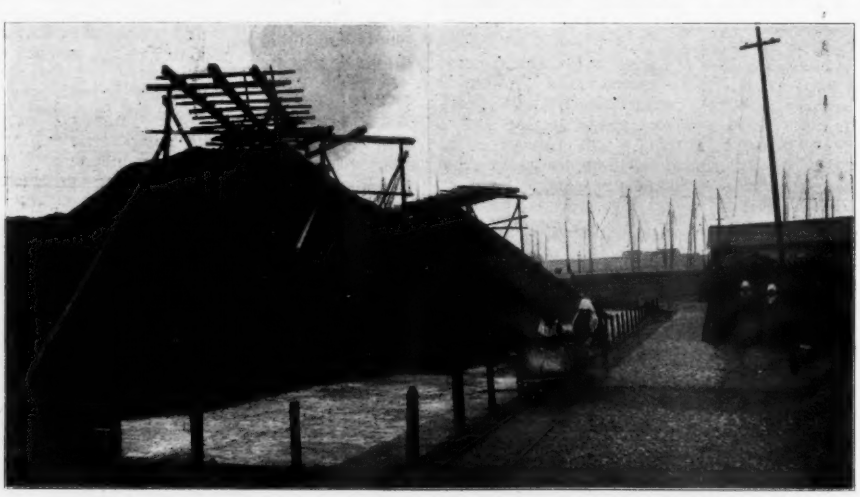
The city that has probably developed quicker than any other in Japan is Osaka, with a population of 1,200,000. It is the great manufacturing centre of the country; and situated on Osaka Bay it has innumerable waterways cutting through the city and crossed by a great number of bridges. The scene on summer evenings is similar to that in Kyoto, with its hundreds of bamboo cafés, picturesquely built and festooned, and sampans and boats lazily floating upon the water, all with garlands of flowers and hung with coloured Japanese lanterns. Neither Venice nor the Riviera can be compared to the delightful scenic effect of a summer evening in the two Japanese cities of Osaka and Kyoto. Osaka still retains an oriental appearance in the daytime by reason of the coloured awnings over the streets, stretching from side to side, and giving shade to the shops and pedestrians. There are a number of substantial public buildings designed on European lines and surrounded by well laid-out parks. The indication mark of the manufacturing town is prominent in the many tall chimneys, which are annually increasing. At the present time, it is readily perceived by the traveller that in Japan one never sees the poverty and degradation noticed in all towns where Western ideas predominate. This is partly owing to the fact that rice, the staple food, is cheap; and the present style of cotton dress is clean and inexpensive. Coupled with this is the fact that the people have not yet been called upon to undertake the class of work that is necessitated by Western manufactories. From information obtained, however, it appears that directly industrial pursuits take hold of the country (which is anticipated immediately the present financial depression is over), the rich will become richer, and the present contented and light-hearted Japanese working class will become poorer; and the general effect of the speedy introduction of Western ideas, with its improvements and vices, will be greatly to deteriorate the stamina and physique of the present hardy race of people.

Pardon this deviation from a city which may certainly boast of acting on the saying "Osaka for the Japanese;" for at present there are only 100 European inhabitants, the majority of whom are Christian missionaries. Mr. Charles P. Cushman, a business-like American, Vice-President and Genegal Manager of the Osaka Gas Company, may himself be said to hold the post of Gas Missionary; and right well and successfully he discharges his duties. This will at once be seen by reading an interesting and instructive account of his methods of advertising and promoting new business, which the writer prevailed upon Mr. Cushman to give from his own pen, as being more direct, vivid, and valuable than if reproduced in other form.*

Without attempting any lengthy comment upon such original and business-like views, one cannot fail to notice the thoroughly earnest, persevering, and determined manner in which Mr. Cushman has undertaken the uphill work of creating a demand for gas. The gas-works were only established in 1905, and have been running for about two years; so that everything was new and on Western ideas, and Mr. Cushman was face to face with a population that had its own methods of cooking and heating by charcoal (in the same way as all Orientals), and had no sympathy at all with the new gas methods. There were no Europeans to look to, as in India and China, for a certain amount of gas consumption; and, consequently, there was no other manner open to him than to create the demand, which has been rapidly accomplished in the manner he has described. In his contribution there are many valuable hints given by which gas managers at home can profit—that is, if they are at all anxious to increase their output, instead of waiting for the increase of population to do it for them. In Mr. Cushman's case, his Company had built a large gas-works, anticipating that they would have 10,000 consumers within two years, instead of which they have, by their splendid business methods, more than doubled this figure; and one now sees the enormous increase of 1000 consumers per month as the fruits of this admirable organization.

Photograph No. 145.—Part of the Show-Room.

The gas managers of the Colonial works visited are all proud of Mr. F. W. Goodenough, the Chief Inspector of the Gaslight and Coke Company, London, for the energy and forethought displayed in his new methods of pushing the sales of gas and fixtures. His business capability has not only been appreciated by his Company; but the advice and suggestions given by him, through the pages of the "JOURNAL," have been followed by dozens of the gas companies visited. The result is that large new sale rooms, with all the latest appliances, have been fitted up, with the gas account desk in the middle, in the centres of many towns; so that customers are brought more in touch with the



Photograph No. 146.—Temporary Gantries for the Steam-Crane for Storing Coal.

* This appears as a separate article in another part of the "JOURNAL;" see p. 622.—ED. J.G.L.

company's goods—thus doing away with the antiquated idea that a gas show-room must be considered as an exhibit only.

Mr. Cushman considers promptness in delivery to be one of the essential features of his system, as he looks upon gas-fires and cookers as consumers' luxuries. When once an order has been sent to the Gas Company's sales department, his method is to retain the purchaser's interest in that article until it is satisfactorily working; and this can be done only if the goods are delivered without delay. But, on the other hand, if prompt attention and delivery are of secondary consideration, then the customer's interest in the purchase has vanished, the apparatus does not get a good start, and is eventually condemned as useless by an uninterested person who has had the goods thrust upon him. To bring the point home clearly to oneself, everybody, when purchasing, requests immediate delivery, and is always eager to have the goods while interest in them is at its greatest height.

The Osaka Gas Offices (partly seen in the photograph on p. 622) are in a palatial building erected by the Company as its centre of management, and for the clerical, engineering, and distribution staffs. The Directors, of whom there are three, meet here and transact their business. These gentlemen are: Mr. N. Kataoka, the President; Mr. Charles P. Cushman, the Vice-President; and Mr. C. Watanobe, the Secretary and Treasurer. The engineering staff of the Company is under the superintendence of Mr. K. Shimomura.

The general sales department is the first the writer passed through. It is well stocked with all classes of gas requisites suitable to the Japanese consumer—from the rice-boiler to the hot-water geyser, gas-engine, &c. A view of part of the show-room is reproduced in Photograph No. 145. The apartment is large and lofty, and shows off the stock to advantage. The staff of this section is located on the spot, so that inquiries or complaints receive the usual prompt attention. On the first floor, one finds the General Manager's office, surrounded by a lot of Japanese clerks, of whom he speaks highly. The engineering offices are on the same floor, and are well fitted for the purpose of general designing, &c. Other offices of interest were also visited.

Then it was suggested that, before viewing the gas-works, a trip in a rickshaw through the city would be helpful in understanding the large amount of work which had been done in so short a time, and also the difficulties in main-laying and distribution which had to be surmounted in this manufacturing city with such narrow streets—averaging about 15 feet wide. The various public buildings are large and substantially built of stone, are to Western designs, and contrast with the small Japanese go-downs and shops lining the streets. All, however, show the commencement of a new era, and one in which the Gas Company will reap fourfold.

Osaka Gas-Works.

The gas-works were eventually reached, and upon entering, a very hearty welcome was given the writer by the Chief Engineer, Mr. K. Shimomura, who was most anxious to show his works and to give any particulars requested, and at the same time said he wished to take the opportunity of having a technical "gas" chat with a fellow "gas man." The conversation turned upon gas-works visited in India, Australia, and China—places where the

Photograph No. 147.—Side View of the Retort-House—The Machine Shop and Store Room are on the Right.

temperature was about equal to that of Japan. The general design of the Osaka Gas-Works in arrangement and details of apparatus is on the American principle.

The coals used are known as Namazito and Mameda, which are very good Japanese coals, giving a fair average of 11,000 cubic feet to the ton and good coke. The appearance of the coal is of rather brown, dirty slack, which packs heavily in the retort, and therefore requires good heats to carbonize it. The coal is received in boats and unloaded by a steam-crane which runs on a gantry. This stacks the coal in the first instance in the open yard, and is continued by means of temporary gantries, seen in Photograph No. 146. It is the custom to work off the stacks in rotation; so that the coal does not lie in the open sufficient time to suffer by the weather. About 10,000 tons are stored, as it is found advisable to have this amount in stock so as to be on the safe side in case of irregularities of supply. The coal is taken to the retort-house by hand, raised by hoist, and trucked along the storage bins on the stage-floor ready for the stokers.

The retort-house is solidly built of brick, with plenty of openings for ventilation, a good height to the walls, and a span giving sufficient space for machinery. The side elevation of the house is seen in Photograph No. 147. At present there are steel-storage bunkers (already mentioned), at each side of the horizontal retort-bench, for the scoop-charging now in use. There is one large bench of eight through beds of nines, 23 in. by 15 in. by 20 ft. long; and one smaller bench containing eight single beds, back to back, of nines, of the same section, but 9 feet long. All the beds are heated by regenerative furnaces; the average fuel consumption being 15 lbs. of coke per 100 lbs. of coal carbonized, which is nothing to grumble at, as the coke has a good deal of ash. Due allowance must also be made in Oriental gas-works for the fact that the workers are not so intelligent as the average European stoker, and therefore the attention to feeding the producers regularly, and pricking and cleaning them thoroughly, is somewhat lacking. All this costs a small percentage in the fuel account.

The system of hydraulic mains and fittings for the former bench is that of Messrs. West's; whereas in the latter a German firm is responsible for the arrangement. The charging scoop is fitted on a light overhead traveller, and is moved along by hand. The weight of each charge is 300 lbs., and the duration of carbonizing is six hours. The internal arrangements of the retort-house may be gathered from Photograph No. 148. The stokers work twelve-hour shifts, and receive 60 sen (1s. 3d.) per man. It must be remembered that they do not do anything like the amount of work a European does, and are therefore not worth as much. It is the usual ratio of 4 to 1. At present there are no elevators or conveyors on the works; but full preparations have been made so that when the time comes this innovation will take place—not so much for the purpose of saving labour, as from the advantage to be gained by organization and the improved *morale* of the stokers. Another point is that it is hard to keep stokers; they leave at the sight of a few sen or pence extra per week, and consequently new men have to be trained.

The coke, when drawn, is dropped below the stage, quenched, and taken away in barrows and stacked in the yard. At present the whole of the coke is sold to one contractor; but Mr. Cushman has a scheme in hand by which he will eventually reorganize the

coke sales, as he is determined to make a demand for coke in small quantities by retail sales, so as to compete with the existing use of charcoal, which is bought by the inhabitants in daily and weekly quantities for cooking purposes. The ashes and clinker from the furnaces are all picked and sorted by women, the good coke sold, and the clinker made into mortar and sold as required. The present price of coke, as sold in the city, is 12 yen (equal to 24s.) per ton. It is of good quality, well burnt off, and clean. Tar also has a good local demand, and is disposed of at 10 sen (2½d.) per gallon.

Walking over to another strongly-designed brick building, one sees three tubular condensers of German make, and one annular condenser, all under one roof. In the adjoining room were two nicely-running exhausters of the Roots type, with a Pelouze tar-extractor following. Extensions are being made to the exhauster-house; and the new machines will be of the Beale type. Continuing, there is one naphthalene washer and one for ammonia, both working very smoothly.

Opposite to this building is the purifying-house, containing four boxes, 20 feet square by 7 feet deep; the covers being flat and water-sealed. Oxide only is used; being carried in the usual baskets. A new revivifying shed is being built alongside, ready for the increased output.

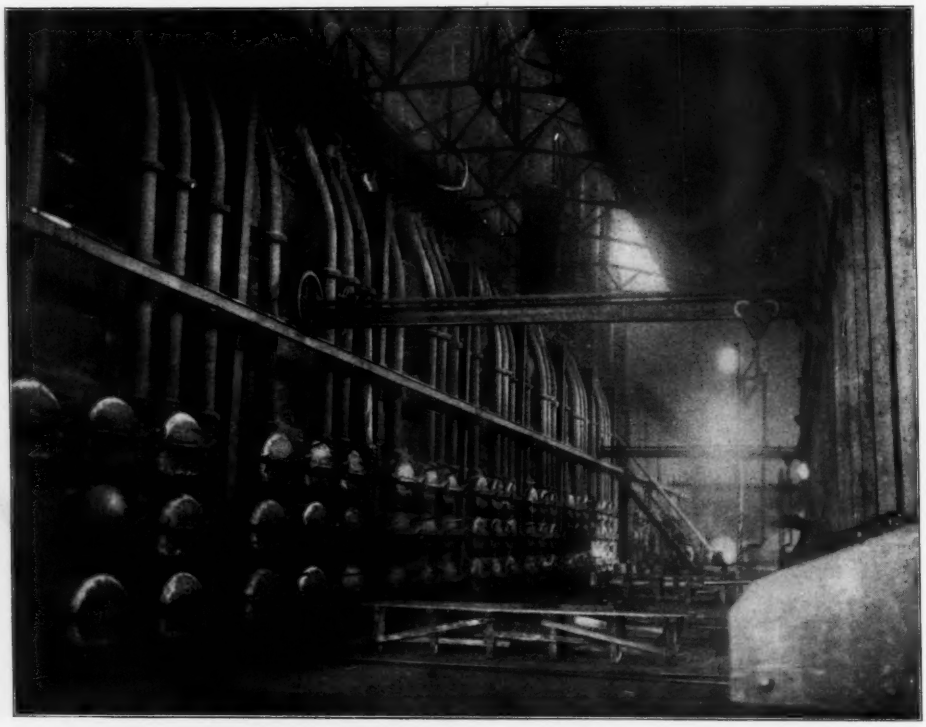
Stacks of bricks are noticed; the peculiar feature being that every set of four bricks is tied together by a strong fibre rope, both for convenience in handling and to prevent breakage.

Looking past these bricks, one sees the water-gas plant, which has a capacity of 300,000 cubic feet of blue gas per day. It was erected by the Engineer on his own arrangement, and is only used as and when required.

One large gasholder, with outside framing and steel tank, of a million cubic feet capacity, stands in the centre of the works. It was built by an American firm, and is seen in Photograph No. 149. Walking a little further, the writer had the opportunity of conversing with two foremen of Messrs. C. & W. Walker, who were acting as erection inspectors on a large 2 million gasholder and steel tank made by their firm. The Gas Company provide all labour and erect the work themselves on piecework; consequently, the Japanese workmen are not willing to recognize the English inspectors, and some friction has resulted. If plates, &c., are all well marked for erection, and erection drawings are supplied (as is the usual custom with contractors), then there is absolutely no necessity to send out English foremen. Each country has its ways and customs of working and of handling tools and tackle in its various erection yards, from which these travelling gasholder riveters and erection men are drawn. The work, as far as one could see, was progressing favourably, and giving every satisfaction to the General Manager.

It is noticeable that in Japan every gasholder has a steel tank; and in no case up to the present has a brick or concrete tank been seen. The reason is that there is so much water in the subsoil that excavation is very expensive and not worth the trouble. The introduction of raised annular tanks in the country would be a great improvement, as they would provide cool shed room for meter and governor or for general stores.

Mr. Shimomura makes a speciality of the tar-distillery and bye-



Photograph No. 148.—Inside View of the Retort-House.

products plant, and buys extra tar for distillation. The Gas Company have a great demand also for their class of oil, which is stored in large reservoirs, seen in Photograph No. 150. This photograph also shows the building which covers the naphthalene ball plant, which is a further source of good profit. This plant is to Mr. Wilton's designs, and was made by the Chemical Engineering and Wilton's Patent Furnace Company, of London. At the present time [July] the Gas Company are also making naphthalene disinfecting paper for putting between clothes to keep out moths and insects; and it acts well. The sulphate of ammonia plant is kept steadily going, as there is a good demand for this product. The plant is of German make, and gives excellent results.

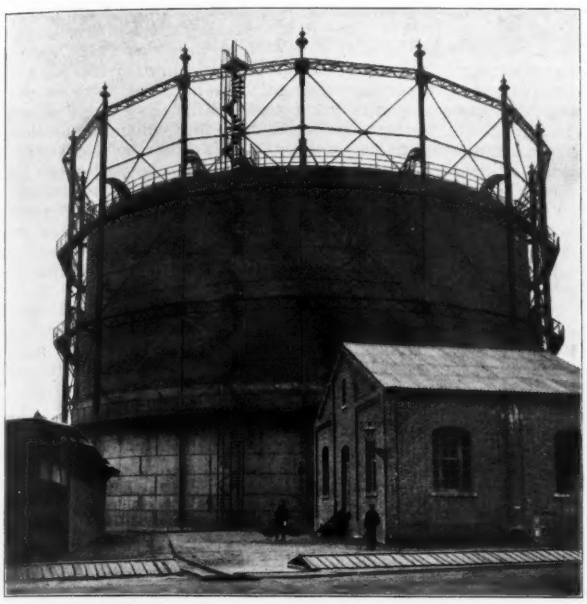
The photograph last referred to (No. 150) also shows a tall red brick tower which stands in the middle of the works, and was built in order to give a good water supply and pressure throughout the works. The water is pumped by the Company from boreholes and forced to the reservoir in the tower.

There is an excellent machine shop for repairs and maintenance. The repairing shops for meters, fixtures, gas-cookers, &c., and the department responsible for all fitting and plumbing, are located behind the head office in the city, as it is found more convenient to have them in the centre of the consumers. The general store-rooms on the works are seen in Photograph No. 151, and are well arranged in keeping with the general systematic organization.

Gas Distribution.

The most remarkable department, perhaps, in this Company is the gas distribution office. Owing to the rapid increase in the gas consumption, which at present is 100 per cent., the length of mains laid (at an average depth of 2 feet), is increasing almost at the same rate. There are now 150 miles; but one cannot foresee what this will be in the near future in a city with a population of over a million people, whose general manner of life is rapidly changing to that of Europeans. The Company fix piping free of expense up to about 50 feet from the gas-main, but make no definite rule, as they prefer to discriminate between the large and small consumer and give a proportionate allowance. They do not charge meter-rents, preferring to charge a small annual sum for the rent of the pipe which connects the meter to the street gas-main. As Mr. Cushman says, in a country like Japan, every small amount counts as much to the customer as the seller, and many of his customers would grumble very much about meter-rents, and would even have them taken out when away on holidays, merely to save the expense. But in the case of the connecting pipe, they would have to pay for relaying it, and so are wiser to leave it alone and pay the small rental charge, which is sufficient to cover the meter-rent as well. The meters in general use are dry ones.

The introduction of slot-meters has not been a success, because the Japanese do not pay for anything until they get it, not from the Indian and New Zealand point of view, where (as has been shown in previous articles) it is considered a reflection to be asked to pay in advance, but purely from the business standpoint that they are used to having their goods delivered before they pay.



Photograph No. 149.—American Built Gasholder and Steel Tank, 1,000,000 Cubic Feet Capacity. The Building in Front is the Meter-House.

Bye-passing the gas-meter and stealing the gas is a practice now seldom tried. Before, when it occurred, Mr. Cushman decided to stamp it out once and for all, so he had the heaviest penalties possible inflicted on the offenders. Occasionally the inspectors catch such a thief and make an example of him. Talking of bad debts, the writer asked Mr. Cushman if he had many; and, if so, what course he took. The reply was that there were very few bad debts; but if the account ran beyond the month allowed, the gas was cut off, is generally usual.

The standard illuminating power is 15 candles—the ordinary jet photometer being used; while the calorific test, though not compulsory, showed 570 B.Th.U.

The general lighting of the city is done in the usual Japanese style by lanterns on each house; but the squares and open places are lighted partly by gas and partly by electricity. Many of the large buildings are going over to gas, owing to it giving better light at less expense; but they keep the electric current installed for driving the fans, which are used all day long in the summer time. There is no high-pressure lighting anywhere, as there has been no opportunity to instal it.

The present price of gas in Osaka is yen 2·20 (equal to 4s. 5d.) per 1000 cubic feet, if paid within the month; if not, then yen 2·40 is charged, or 4s. 10d., so there is a reduction of about 10 per cent. for prompt payment. No comparative price is available for the electric light, as the charges for it are based on candle-power per lamp per hour.

The annual make of gas is now 360 million cubic feet, and the maximum daily output from the works is 2 millions. But, as has been already stated, with the percentage of increase at 100, no one can say what the consumption in five years' time will be, as it depends largely on the state of trade throughout the country. Directly the present financial depression is relieved, then Japan will go rapidly forward. The Osaka Gas Company are quite aware of the true position, and both the General Manager and the Engineer are anxious to keep up the methods of organization and retain the reputation that the Company hold for promptitude in all things.

Photograph No. 151.—General Store Rooms on the Works.

About one-third of the gas sold is used for fuel; there being about 29,000 rings in use, with an increase of 1000 consumers per month. The gas-engine trade is also very good; there being over 800 engines of various sizes at work. A greater field for gas-engines is anticipated in the near future.

Mr. Cushman was most interesting in his conversation on Japan and the Japanese, and how he had found them. He related an incident of how the Company had received a large order to put in gas and fixtures in a new house, and while preparing to carry out the work, a letter arrived cancelling the order, as the owner had decided not to have gas. Nothing more was then said; but Mr. Cushman determined to find out the why and wherefore of this sudden change. After a time, he discovered that the customer was in the habit of going to a certain fortune-teller or clairvoyant, who had a little grudge against some minor gas official, and so he had prophesied that his client would be unlucky if he had gas in his house. Upon learning this, Mr. Cushman immediately sent the clairvoyant a customer, who had his fortune told and left double the fee asked for. The same customer went again and did the same thing, and ever afterwards "gas" was written down as lucky in that clairvoyant's fortune-telling vocabulary. Japan is not quite as bad as India in its superstitions; but, being an Oriental country, mystic science is greatly believed in, and can make or mar a man in a small way of business, if the "sakate," or gratuity, is not forthcoming.

The Osaka Gas Company's concession, or franchise, as it is termed in America, extends for a period of fifty years, with the option of renewal under certain terms. The Company naturally place great weight on their accumulated reserve fund. In July, the principal shareholders of the Company held a meeting and agreed to increase the capital by yen 2,000,000 (£200,000); thus making the total up to yen 6,000,000, or £600,000. This proposal and others, with the half-yearly report and accounts, were to be placed before the general meeting at the end of July, and no doubt will all have been adopted by the time this article appears in the "JOURNAL." The profit of the Company for the last

Photograph No. 150.—Oil Reservoirs, Naphthalene House, and Water-Tower.

half year amounted to yen 194,746, equal to about £19,474. Of this sum, yen 9738 (or nearly £974) are due to the Municipality for the use of the public roads; leaving a net profit of yen 189,872, or about £18,500, of which some will be placed to reserve, and the remainder available as a 9 per cent. dividend among the shareholders. No doubt the market quotations of the Osaka Gas Company's shares, which are quoted in "The Japan Daily Mail," will rapidly rise from the present [July] figure of yen 78 (£7 16s.) *ex* div. for the yen 50 (£5) paid-up shares, the previous dividend upon which was at the rate of 8 per cent. In any event, the shareholders may rest assured that, as regards the splendid organization and equipment of the gas-works throughout, they have an asset which is improving in value daily, and which has a huge undeveloped and untapped store of wealth at present lying dormant among the inhabitants of the thriving manufacturing city of Osaka.

The writer is greatly indebted to Mr. Cushman for the kindness and courtesy extended to him, and for the general information contained in this article. He was also pleased to meet such a practical organizer and worker, and to have the opportunity of being shown round by the originator of a unique scheme which has already produced 22,000 consumers in so short a time, and who has set his mind upon doubling this within two years. The Directors and shareholders must hold the same high opinion of Mr. Cushman as the writer does. To Mr. Shimomura many thanks are due for much technical information obtained in conversation with this pleasing and willing gas expert.

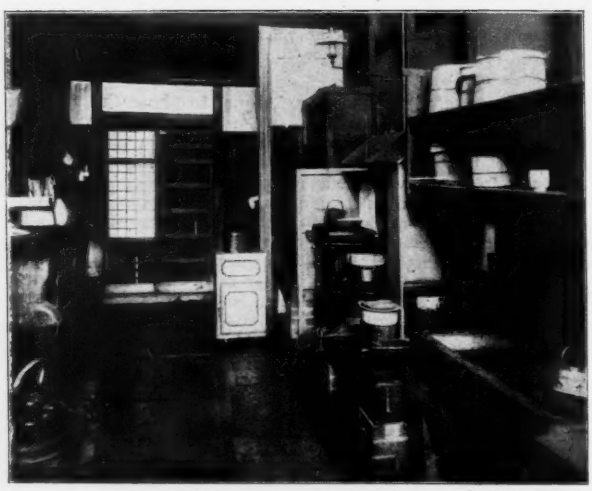
ADVERTISING AND NEW BUSINESS PROMOTION IN THE FAR EAST.

By Charles P. Cushman, of Osaka, Japan.

The English or American manager transferring the work of his department to a city in the Far East, very naturally carries with him somewhat settled ideas concerning the requirements of gas customers. These ideas are, of course, based upon Western methods of life, and the manager's re-education to Eastern ways and Eastern civilization is often attended by mental reactions and attempts to force upon customers manners and methods entirely unadaptable and useless to Eastern economy. A Japanese gas manager, recently visiting America, was repeatedly pestered by enterprising stove salesmen to order quantities of kitchen ranges, larger hotel cookers, baking ovens, instantaneous water-heaters, bread toasters, broilers, and other appliances about as useful in Japan as the Hibachi is in Europe and America.

Japanese Rice Gas-Boiler.

No people are more ready and willing to adopt useful and convenient methods than are the Japanese. But it is not sufficient to show that a new method is useful in London or New York or Berlin. It must be useful in Osaka and Tokyo and Kobe, and should not imply a complete change in the customer's manner of living. Rice cannot be boiled in a baking oven, nor can vegetables and fish be cooked on a sad-iron heater. Experience has shown that the best suggestions as to the adaptability of gas to Japanese life have come from the Japanese themselves. The rice boiler shown in the photograph, the kitchen burner, which is fitted into the Japanese kitchen brick arch, the water-heater, which is inserted directly into the Japanese bath tub, the wire frame anti-vibrating lamp, and many other simple devices, have proved in every way economical and adaptable for the style of houses and methods of cooking and heating, &c. [A photograph is shown of a Japanese kitchen.]



A Japanese Kitchen and Gas Utensils.

In the ordinary course of learning a new truth, much time may be wasted in finding out that these simple but effective appliances are the only practical utensils by which the gas business may be quickly and permanently promoted in Japan.

Having knowledge of the proper fittings and appliances through which to introduce our product, the gas manager should again remember the Japanese have their own ways of soliciting business and approaching the public generally; and it is probable that the canvasser of our own Western countries would secure few (if any) orders by approaching the public in our usual brusque manner. The Japanese canvasser will improve every opportunity of explaining with great care the smallest detail of gas using, and will try in every way to make the burners, the cooker, and the rice-boiler fit the needs and pocket book of each customer. He will also explain the operation of the gas-meter and the way to read it; and it has been found that the "advance talks" on these subjects constitute the best and most efficient advertising possible. After an order is taken, it is our aim to have the same executed within 48 hours, because promptness is also a most valuable advertising medium and one that so many companies lose sight of.

Having installed the house piping, lighting fixtures, cookers, &c., do not suppose that the customer is permitted to "go his way in peace." Not at all. After each installation, our most important agent calls for a demonstration. The demonstrator is a young Japanese lady, of whom the Osaka Company have ten. It is her duty to explain again to the customer, usually the lady of the house, how the gas is most economically used, how the meter reading is taken, the care of the mantle, &c. When the demonstrator leaves a new customer, she explains that the "cartman" will call each week for the purpose of making small repairs and adjustments of appliances, and that he will also supply mantles, burners, and other small parts at cost price. [These repairing carts and cartmen have been specially photographed for this article in front of the Osaka Gas Company's offices.] If the customer orders additional burners, cookers, or a rice-boiler, the demonstrator again calls to learn if the same have been properly installed. In every case where a customer has stopped the use of gas, even for a month, the demonstrator calls to learn if any dissatisfaction exists, and to make a report to the manager of her department or head demonstrator, who is also a lady. Over two years' experience with these demonstrators has proved them to be most excellent and satisfactory. The Japanese woman is invariably polite and extremely patient. Of course, the East has the advantage of cheap labour of all kinds, and "manual advertising" in the form of numerous canvassers, demonstrators, and cartmen, is more practical than in Western countries. The female demonstrator is, to some extent, used in the United States; but the principal feature of the department is not fully recognized. It is our endeavour to make our demonstrators our "drawing-room department," so to speak, to smooth out all matters of dissatisfaction, petty annoyances, and misunderstandings, and to teach the use of gas in every form for the household.

A Specially Taken Photograph of the Carts and Cartmen in Front of the Offices of the Osaka Gas Company.

At the beginning of our business (three years ago), it seemed that no considerable part of the gas sales would come from the use of cookers, although we did more than the usual amount of advertising of standard English appliances, with the somewhat discouraging result that less than 100 regular American ranges were put into use. But by the steady application of local ideas, constant educating, and advertising through our busy young Japanese men and women, we have put out 16,500 one-burner cookers, 5000 rice-boilers, 6000 Japanese kitchen burners, and 1000 heating appliances. With the above particulars should be taken into consideration the fact that the total number of customers is 21,900; and our present rate of increase is over 1000 per month. It is true that the average monthly consumption by a Japanese customer is considerably less than that of a European customer; but the low cost of maintenance, book-keeping, meter reading, &c., makes the prospects most attractive and inviting.

MANCHESTER DISTRICT INSTITUTION OF GAS ENGINEERS.

Quarterly Meeting at Oldham.

The One-Hundred and Fifty-Fourth Quarterly Meeting of the Institution was held at Oldham last Saturday; and there was an unusually large attendance of members. A very full programme had been prepared for the day; but it was got through in every detail, mainly owing to the completeness of the arrangements made, and the energy of Mr. T. Duxbury, the President of the Institution, who acted as *cicerone* over the works he has under his control as Gas Engineer to the Oldham Corporation. Then the members of the Gas Committee, with the Chairman (Alderman Jason Thompson, J.P.), showed the keenest interest in the visit, as did the Mayor (Alderman Bolton). In honour of the event, flags were flying from the Gas Offices, the Town Hall, and the works at Hollinwood and Higginshaw.

The Mayor's Welcome.

Early in the forenoon, the party assembled at the Town Hall, where the Mayor held an informal reception. In a brief address, he said the assembly was probably the most unique one that had ever taken place in Oldham. He understood they had present gas engineers and managers from six different counties; and he wished to extend to them a hearty welcome to Oldham. He was afraid that as they proceeded through the streets of the town they would not be very much struck by handsome buildings. It had been always said of them in Oldham, by people visiting the town, that they had no time to put up elaborate buildings, because they were too busy making money. This might be a fault, but it was a very natural one to everybody. It was quite possible they in Oldham might not be able to show the visitors anything which they had not seen before; but if they did see something which was an improvement on other places, he was sure their visit to the town would have been repaid. Conferences such as the one they were having were bound to be productive of good, because of the opportunity they afforded for an exchange of ideas; and the more they had of them the better off would they be. Again he desired to extend to them the heartiest of welcomes to Oldham, and hoped the visit would prove profitable to them in their profession.

After partaking of the Mayor's hospitality in the way of refreshments, the party proceeded in special tramcars to the Hollinwood Gas-Works, a description of which will be found elsewhere (see p. 627).

Luncheon at the Town Hall.

Returning to the Town Hall, the members were entertained at luncheon. Alderman Jason Thompson presided, and was supported by the Mayor, Mr. H. Wilde, J.P., Vice-Chairman of the Gas Committee, and the following members of that body: Messrs. Ashton, Bullough, Fletcher, Gilliat, and Ogden. There were also present Mr. T. Duxbury, the Gas Engineer; Mr. A. Andrew, the General Manager of the Gas-Works; Mr. J. W. Morrison (Sheffield), Mr. E. Allen (Liverpool), Mr. H. Kendrick (Stretford), Mr. J. G. Newbigging (Manchester), Mr. W. Whatmough (Heywood), the Hon. Secretary of the Institution, and other officials.

At the conclusion of the luncheon, only one toast was submitted, owing to the full programme to be got through.

A Record of Progress.

Mr. J. W. Morrison, in proposing a vote of thanks to the Mayor and members of the Gas Committee for the generous way in which the members had been treated, took the opportunity of making complimentary references to the enterprise shown by those who were associated with the development of the Oldham Gas-Works. He said those present were no doubt aware that Oldham was one of the first towns to take the manufacturing of gas into their own hands, and since then the results had shown one continuous record of progress; and perhaps he might be pardoned for saying that following the appointment of their President as Gas Engineer, progress had been made by leaps and bounds. From published statistics, they would see that during the last seven years there had been a great development of the gas undertaking. In this period the price of gas had been reduced from 2s. 5½d. to 1s. 11½d. per 1000 cubic feet—a decrease of 6d., representing a saving of £32,000 per annum. This must have been of great benefit to the community, giving as it did opportunities for the establishment of new industrial concerns in the town. The net profits on a year's working of the undertaking had advanced from £583 in 1901 to £14,592 in 1908—an increase of upwards of £14,000. The quantity of gas manufactured in the same years had risen from 1,243,384,000 to 1,471,434,000 cubic feet, an increase of 18 per cent. The gas made per ton of coal in 1901 was 9872 cubic feet; whereas in the present year it was 11,539 cubic feet—an increase of 1667 cubic feet, representing 18,000 tons of coal. Proceeding, Mr. Morrison gave the following further figures in support of his point: Carbonizing wages per 1000 cubic feet made, 2·439d. in 1908 against 4·831d. in 1901, a decrease of 2·392d., or 60 per cent.; purifying wages, 0·353d. in 1908, compared with 0·915d. in 1901, a decrease of 0·560d., representing over 60 per cent.; total cost of manufacture, 19·581d. in 1908, against 27·296d. in 1901, a decrease of 7·715d., representing a saving of £47,000 per annum; net cost of gas in the holder, 1s. in 1908, compared with 1s. 6¾d. seven years ago, being a decrease of 6¾d. With regard to residuals, the coke sold per ton of coal had advanced in the same time from 8 cwt. to 9½ cwt., an increase of 1½ cwt.; ammoniacal liquor from 19·9 to 25·2 gallons, an increase of 5·3 gallons; and the quantity of tar made from 12·8 to 13·5 gallons, an increase of 0·7 gallon. These figures were striking evidence of the progress made at Oldham in the years under review, and reflected great credit on the Gas Department and those who were responsible for such excellent results. In addition, the Gas Department had supplied gratuitously for public lighting 88 million cubic feet of gas per annum; and if the Gas Committee had received payment for everything, they would have been able to supply gas at 1s. 7d. per 1000 cubic feet. It must be very gratifying to men like Mr. Duxbury and Mr. Andrew to be able to show such good results. The members of the Institution were proud of their President. That he was the right man in the right place he thought everybody would admit. Referring to his resolution, he said the reception the members had met with that day had been of the most cordial character, and their thanks were due to the Mayor and to the Chairman and members of the Gas Committee.

Mr. E. Allen (Liverpool), in seconding the proposition, said that in their inspection of the Hollinwood works they had seen how Mr. Duxbury had made use to the best advantage of the various portions of the plant. In fact, they had had the opportunity of appreciating how an old gas-works had been modernized, and that most thoroughly.

The resolution having been carried by acclamation,

Alderman Thompson, in reply, expressed the pleasure it had given him and his colleagues to welcome the members of the Institution to Oldham. He could not help thinking, however, that it was not Oldham and its gas-works that had induced them to come together in such large numbers. As the Mayor said, they could not boast of a beautiful town, or of having buildings of fine architectural character; but he thought they could claim to have some that were suited to the requirements of the town, and which for utility would compare favourably with others. They could not claim to have a garden city; but they had done the best with what Nature had given them. As he had previously remarked, he did not think it was Oldham they had come to see, but to honour their esteemed President; and with him he would like to associate the name of their General Manager (Mr. A. Andrew). At the same time, he and his colleagues fully appreciated the visit, and recognized that they were engaged in a business of great magnitude. Some of their businesses were conducted, or rather controlled, by municipal authorities, and others by private companies; but he thought that they were all actuated by the same spirit and the same aim—the production and supply of cheap gas and of the best quality for the consumer. Referring to what Mr. Morrison had remarked about the progress made in the gas undertaking at Oldham, he said it was quite true they had made in the last seven or ten years very extensive alterations at their works; but he would like to add that it had not all been owing to one man. They all recognized the great ability of Mr. Duxbury; but they did not forget the commercial ability of Mr. Andrew. For himself, he held the opinion that in the gas industry a little competition did them good—it made them more on the alert. There was no doubt that the advent of electricity for lighting, heating, and commercial purposes had done much to stimulate gas engineers to greater efforts in the way of improved method, so that gas could hold its own. He believed that in this respect they had still greater improvements in store, and that gas would continue to keep its position not only as an illuminant, but for heating, cooking, and commercial purposes. In conclusion, the speaker went on to show what had been done in Oldham to keep to the front; and he incidentally referred to the trouble they had had with naphthalene. These difficulties were, he said, being overcome, and a great improvement was now recorded.

The Business Meeting.

The Business Meeting was subsequently held, under the presidency of Mr. Duxbury, in the Council Chamber at the Town Hall. The *agenda* did not contain many items, as time was short in view of the afternoon's visit to the Higginshaw Gas-Works.

The Late Sir George Livesey.

The President said he did not think they ought to commence their business without first making some reference to a sad event which had occurred since their last meeting. He referred to the death of Sir George Livesey. The Committee had already, on behalf of the members, sent to Lady Livesey a letter extending to her their sympathy in her sad bereavement; and, though rather late in the day, he thought they, as a general body, should endorse this expression of sympathy. They were indebted to the Press for the full notices they had given of the late Sir George Livesey. He was sure they all felt that by the death of Sir George they had lost one of their greatest supporters—not only one of the greatest supporters of gas manufacture, but also of gas distribution and gas companies, and who was at the same time a strong supporter of the gas consumer. He (the President) had always looked

upon Sir George Livesey as one of the greatest advocates of the gas consumer and the workpeople employed by gas companies. They desired, therefore, to place on record the regret they felt at the death of so eminent a gas engineer and gas advocate.

It was agreed in silence that such a record as that indicated by the President should be put in the minutes.

Minutes of Last Meeting.

The Hon. Secretary (Mr. W. Whatmough, of Heywood) then read the minutes of the last meeting, held at Bradford in May; and they were confirmed without discussion.

The Benevolent Fund of the Institution of Gas Engineers.

The President explained that since the last meeting he had had the pleasure of attending a meeting in connection with the Benevolent Fund of the Institution of Gas Engineers in London, when there was a long discussion as to ways and means. He took particular care to go into a number of cases which had been relieved through the fund, and were still receiving grants; and he could assure those present that the Benevolent Fund was doing a great work—a much greater work than he had ever imagined. He felt that all gas engineers ought to subscribe to the fund, if it was only 5s. or 10s. 6d.; and he made an earnest appeal to them on its behalf. So strongly did he feel the claims it had upon them, that he had promised not to rest satisfied until the number of members of the Manchester District Institution subscribing to the fund had reached three figures. He could not appeal too strongly to them to increase the funds of this noble institution. The Committee of the fund had adopted a suggestion of his whereby every District Association would have a representative upon the Committee, who would report to the members quarterly or annually as the case might be. He had been elected to represent their own Institution, and would report to them quarterly on matters referring to the fund.

Mr. R. G. Shadbolt asked the President to adopt the suggestion he made at the last meeting of the Eastern Counties Association—that was, to send the plate round. When everybody was in a happy mood, it was astonishing what could be got in the way suggested. At the meeting of the Eastern Counties Association, he believed they got upwards of £10; and he did not see why they should not do the same that afternoon.

Mr. S. Meunier (Stockport) expressed the opinion that if the President were to tell them the result of the special appeal made at the Bradford meeting it might help them.

The President said he had not the figures at hand, but he could say that the response was so small that he did not bring it before the meeting of the Benevolent Fund Committee. Unless Mr. Whatmough had some additional names, the result of the special appeal made by him at the last meeting was only ten new subscribing members, whose contributions varied from 5s. each to £1 1s.

Mr. J. C. Belton (Chester) said he was not a member of the Committee of the Benevolent Fund, but was one who knew something about the work it did. Some months ago, he received a letter from the Secretary of the Institution of Gas Engineers (Mr. W. T. Dunn) asking him to call upon a case not many miles from Chester, which had for some time been upon the funds for benefit. He thought if those present had been with him then, and seen how gratefully the small benefit given was appreciated, their sympathies would certainly have been aroused on behalf of the Benevolent Fund. They knew as well as he did that there were in their profession a great many men who were not in the happy position of having anything like a decent salary; and it often happened that if these men became incapacitated by affliction they were badly in need of some help, while in the event of their removal by death, their families were, as a rule, badly left, because the bread-winner had not been able to squeeze out of his employers a "living wage." If the families were not left exactly destitute, they were pinched, knew what it was to be poor, and had to deprive themselves of some of the comforts which a little help from the Benevolent Fund would enable them to provide themselves with. He appealed to the members not so much as gas engineers but as men with hearts—with sympathy for the sufferings of others—to give what support they could financially to this very excellent fund.

Oldham Corporation Gas-Works.

The President's description of the Oldham Corporation Gas-Works (see p. 627) was taken as read.

Election of Officers and Members.

The President stated that the number of votes recorded for the election of officers for the ensuing year was 76; and he was pleased to say that the following had been chosen by a unanimous vote:—

President.—Mr. J. W. Morrison, of Sheffield.
Vice-Presidents.—Mr. H. Kendrick, of Stretford; and Mr. G. H. Niven, of Cleckheaton.
Hon. Treasurer.—Mr. T. Newbigging, of Manchester.
Hon. Secretary.—Mr. W. Whatmough, of Heywood.
Committee.—Mr. J. G. Newbigging, of Manchester; Mr. A. E. Mottram, of Ossett; Mr. J. H. Buckley, of Formby.
Auditors.—Mr. C. Elliott, of Leyland; and Mr. W. L. Donaldson, of Lymm.

The announcement of the unanimous appointment of Mr. Morrison as President was greeted with much applause, as was also the re-election of Mr. T. Newbigging as Hon. Treasurer.

The following new members were elected: Mr. W. Ewart Brock, of Denbigh; Mr. F. Gibson, Valparaiso; Mr. W. Jonas, Earby; Mr. N. G. Lemmon, Hollinwood; Mr. Gerald Milton, Penistone; Mr. S. Tagg, Preston; Mr. P. D. Walmsley, Tyldesley.

Concluding Business.

Several notices of motion had been received in regard to the alteration of rules; and the President expressed the hope that these would receive the careful consideration of the members before the next meeting.

This concluded the business meeting.

Visit to the Higginshaw Gas-Works.

The members then proceeded by special tramcars to the Higginshaw Gas-Works—Mr. Duxbury again filling the position of guide.

Tea at the Town Hall.

After the inspection of the works, the party returned to the Town Hall, where they partook of tea—Mr. Duxbury presiding.

At the close of the repast,

Mr. H. Kendrick (Stretford), in proposing a vote of thanks to the President and Mr. Andrew for the excellent arrangements they had made for the members of the Institution, said it required no words of his to recommend such a resolution for their acceptance. They all knew Mr. Duxbury quite as well as—some of them better than—he did. As to Mr. Andrew, he was not so well known to the majority of the members as to those in the immediate neighbourhood of Oldham; but he was deserving of praise for the work he had accomplished in connection with the gas undertaking.

Mr. J. G. Newbigging (Manchester), in seconding the proposition, said he was sure all would agree when he said they had had a very pleasant visit to Oldham. They had seen many things of interest at the gas-works, and had noticed that Mr. Duxbury was making every effort to reduce the cost of the production of gas, which in these days of stress was very necessary. He did not wish to take a too pessimistic view of affairs, but they knew that the condition of things to-day with regard to gas was different from what it was twenty years ago, when gas supply was looked upon as a monopoly. Nowadays they were surrounded by very severe competition; and therefore it was necessary that they should use every means possible for reducing the cost of the production and distribution of gas. It was more than twenty years since he first visited the Oldham Gas-Works; and he had been very much interested that day in noticing the progress which had since been made. He himself thought it was necessary they should have commercial men in their Institution; and he was pleased that Mr. Andrew had been made a member. As to Mr. Duxbury, they all knew that in his earlier days he was with Mr. Carr, of Widnes; and, of course, they expected great things from him in cheapening the cost of production of gas.

The resolution was carried with hearty applause.

The President, in acknowledging the compliment, desired to recognize the assistance he had had, in making the arrangements for the visit that day, from the Mayor, the Chairman and members of the Gas Committee, Mr. Andrew, and Mr. Massey, his right-hand man.

Mr. Andrew, who had a most cordial reception, in the course of his remarks, said that what little service he had rendered to make the visit an enjoyable one had been gladly and willingly given. He occupied the unfortunate position of General Manager of the gas-works, which he knew was not looked upon with favour by many gas engineers. He would say this, however, that it was not possible for two officials to work more harmoniously together than he and Mr. Duxbury did.

A smoking concert followed the tea; and a very pleasant time was spent.

Mr. Frank H. Robinson, Engineering Assistant to Mr. J. G. Newbigging, M.Inst.C.E., the Gas Engineer to the Manchester Corporation, was successful at the recent examination for associate membership of the Institution of Civil Engineers.

The Aldershot Gas and Water Company have lately lost one of their Directors in the person of Mr. Henry Wells, J.P. Deceased for more than half-a-century played a notable part in the history of Aldershot, and was Chairman of the Urban District Council. At the funeral, which was largely attended, the Company were represented by Mr. W. T. Robertson and Dr. Stroyan, Directors, and by Mr. R. W. Edwards, the Secretary and General Manager.

According to "Engineering Record," heating hot air by utilizing the waste heat of a gas-engine is now practised at a manufacturing establishment in Pennsylvania. The air heater for this purpose is novel, in that both the exhaust gases and the jacket-cooling water are made use of; the fresh air passing to the fan through large thin-walled metal tubes, around which the exhaust gases pass, and within which are radiator tubes carrying the hot jacket water. While this water ranges from only 120° to 150° Fahr., compared with the 600° to 800° Fahr. of the exhaust gases, it serves to compensate for the varying volume, and consequently heat contained in the exhaust. The installation is stated to have proved successful.

THE PHOTOMETRY OF GAS.

One of the papers prepared for the recent annual meeting of the American Gas Institute was on the above subject. The author—Mr. CHARLES O. BOND, of Philadelphia—acknowledged at the outset that, in view of the full report which had already been made by a Committee of the Institute,* the task of saying anything further was a somewhat difficult one. Yet a few questions had been left open; and these he considered of sufficient importance to submit to the members for discussion. The author divided his paper into five sections: (1) Suggestions for bettering conditions within the photometer-room and for improving the accuracy of settings. (2) Sampling the gas to be tested. (3) The selection of suitable reference and working standards. (4) A discussion of what should constitute a test-burner. (5) Speculative remarks as to the future of photometry in the gas industry, and of the relation which the American Gas Institute should bear to it. We give below some of the author's remarks on each branch of his subject.

IMPROVING ACCURACY OF TESTING.

(1) In the scheme submitted by the Committee for securing adequate ventilation in the photometer-room, it was shown that it would be necessary to move 36,900 cubic feet of fresh air through the room each hour in order that the carbonic acid content (which served as a measure of the vitiation) should not show any appreciable increase. In the case supposed, there was one person, one pentane lamp, and one gas-flame, each discharging its products of combustion into the room; and these together comprised the sources of vitiation. This seems a large volume of air to move, and raises the question whether in very cold weather it would be feasible to properly heat it before its admission to the room. It seemed that if a form of hood could be devised immediately over the two main sources of vitiation—the flames—it might be possible to conduct away their products at once without contamination of the body of air in the room, and yet to so proportion or control the hoods as to avoid violent direct draught, which would make the flames unsteady.

The heated products of combustion over a flame rise vertically with great speed; and yet, because of the enormous difference in temperature between themselves and the immediately surrounding air, these upward streams remain comparatively small in diameter for a considerable height, and cause but little disturbance beyond their circumferences. This is especially true of a directed stream of hot gases such as comes from the cylindrical chimney of a pentane lamp, or from the chimney of an argand burner. It thus seemed easy to carry out the plan referred to above.

To prove the point, two tests of the carbonic acid content of a photometer-room were first made over a period of two hours, when the room was ventilated by the ordinary method. In the centre of the ceiling was a wooden shaft extending 3 feet above the ceiling outside, and having a sectional area of about 1·3 square feet. At one side of the room, near the floor, a 1 square foot air-inlet was cut. After a sufficient number of tests had been made under this condition of ventilation to give satisfying data as to its efficiency, the other method was tried. In this case, a hole was cut in the ceiling directly above each flame, and through these holes sections of 6-inch stove-pipe were lowered to different heights above the flames. The intention was to find such a position as seemed to convey away all the waste products without inducing a strong disturbing draught at the flame. Lateral openings also were cut in the flues, just below the point where they were inserted into the ceiling; and the upper lip of these lateral openings was made to protrude over the lower lip in such a manner as to induce a slow draught inwards as the hot gases rushed upwards inside the flue. This served the purpose of removing steadily the upper layer of air in the room, which it was thought would tend to neutralize the vitiating effect upon the air of the person in the room.

It was found that a satisfactory height for the bottom of these flues was 20 inches above the top of the pentane chimney and 20 inches above the open gas-flame respectively. The doors and windows of the enveloping room were kept open so as to retain a pure air supply in the outer room, from which it found its way through the 1 square foot opening into the photometer-room proper. In order to find if wind variations above the flues would cause induced draughts in such a way as to flicker the flames, an electric fan was set up, blowing a stream of air rapidly across the tops of the flues without the effect feared.

The tabulated carbonic acid results by the two methods are here given:—

Waste Gases Removed by Direct Ascent.		*Waste Gases Spent into Room.*	
Hour.	CO_2.	Hour.	CO_2.
11.45 a.m. (Room closed)		2.10 p.m. (Room again closed)	
12.00 noon	0·055	2.25 p.m.	0·090
1.00 p.m.	0·055	3.00 ,,	0·135
1.30 ,,	0·060	3.25 ,,	0·160
1.45 ,, (Room opened)		4.30 ,,	0·200
2.00 p.m.	0·055		

The question may be asked, how, in practice, will the vitiated air be removed from the enveloping room? for, if it is not thoroughly removed, it will to some extent move circuitously, and be again drawn into the photometer-room at the bottom. The remedy will lie in a still further extension of the vertical flue through the roof to the outer air, where a cover must be provided for it to keep out the deposition from the atmosphere. But in this case the extension will not be of the 6-inch flue proper. It will consist of a larger flue encircling it, and overlapping it for (say) 3 inches—leaving a free annular space between the two. This will permit the hot spent gases to continue their vertical rise, and to induce still another flow inward of air through the annular space. It will serve another purpose; for if a violent wind should arise outside, tending to increase the draught up the flues, there will be two openings in the flue above its bottom, serving to minimize the pull from the bottom of the flue, and protect the flames from draught disturbances. This would seem to prove that it is not necessary to move 36,900 cubic feet of air per hour, as was contemplated by the Committee's report.

A simple check on the accuracy of a setting of the disc is possible where the Leeson comparison disc is used. It will be found that there is a position to the right of the correct setting where the right-hand star will practically disappear; and another to the left where the left-hand star will disappear. If the scale reading on the reader's right be called $r1$, then the disc reversed and the scale reading on the reader's left called $r2$, while the correct average setting of the disc for an equal illumination of both sides of it is called $r3$, it can be proved that $r3 = \sqrt{r1 \times r2}$. This applies to those photometers commonly used in gas photometry the scales of which are so graduated as to show directly the ratio of one compared light in terms of the other. This method enables a photometrist to check his setting by the observation of a field different in appearance from that which the eye had grown accustomed to, and without change of his position. A small mirror may be conveniently arranged for reflecting light on the scale after each setting is made.

A fallacious belief exists with many people that in the use of the Bunsen or of the Leeson disc the right eye sees the right side of the disc and the left eye the left side of the disc simultaneously, and that judgment of the correct setting is made under this condition. As a matter of fact, the judgment is ordinarily reached by shifting the gaze of the focussed eyes rapidly from one star to the other; the image of one persisting long enough to enable it to be compared with that of the other. This action is made easier if the eye is not placed too close to the disc, but remains at such a distance—say, 18 or 24 inches—as calls for a small angular movement of the eyeball in order to shift the gaze from one star to the other. The Committee in their report suggested that a source of error in setting the disc might be removed by taking readings from both the back and the front of the photometer-table. I have tried this suggestion on a photometer in regular use, where gases of different illuminating powers were employed; and it would seem, from the results obtained separately by three readers, that the extra work involved by the suggestion is quite unnecessary.

SAMPLING GAS TO BE TESTED.

(2) It remains to fix upon the proper place in the process of manufacture from which to draw the sample of gas, and to discuss the best manner of obtaining a representative sample. The question as to the "quantity" of gas manufactured is answered at the station meter, when it has reached its finished state and is ready for storage. And, in accordance with usage in measuring gases the volume there registered is corrected to 60° Fahr. and 30 inches barometric pressure. It would seem that the determination of "quality" should be made at the same point—that is, at the outlet of the station meter; these two determinations to be used in calculating the manufacturing results of the works. Unless the gas is subjected to a process for further enrichment, such as by benzol at the outlet of the gasholders, there seems little virtue in taking samples from any place more distant than the one suggested.

An ideal sample would require the continuous passing of a small fixed percentage of the station-metered gas to the photometer, where it would be continuously tested, and the average candle power for each hour credited to that hour. As no recording photometer of an accurate type has been devised, this becomes impossible; and even in the large works the candle power is rarely determined oftener than once an hour. Yet it is possible for a considerable variation in candle power to occur in an hour, either in the manufacture of coal gas or of water gas; and this variation may be accidental or intentional. In order that these variations may all be included in the hourly average, there remains only one way—viz., to store samples of gas for the unit period (usually an hour), then photometer the stored sample, empty the holder, and begin the storing of the next sample. This method is in use at the Beckton Gas-Works, where about 60 million cubic feet of gas per day is made; and Mr. Grafton told me that the method worked admirably—his holders, of between 5 and 10 cubic feet capacity, being completely saturated—and that he considered there was no loss in illuminating power from the hour's storage.

I recall an instance in which gas was sold and delivered from one company to another at varying rates of flow, so that equal photometric intervals would have been incorrect for determining the illuminating value. A small deep-sealed wet meter was geared to the drum of the station meter, and the holder into which it discharged was so counterweighted as to throw only half-an-inch pressure. In this way the small meter became a pump, and delivered to the sampling holder an exact proportion of the gas passing the station meter during whatever interval elapsed—usually 24 hours. The system worked well; and when the candle

* See "JOURNAL," Vol. C. p. 486.

power of the stored sample was compared with the average of frequent photometric readings taken over the entire period of storing, remarkably close results were obtained.

Having collected a proper sample from the right place in the system of manufacture, there still remains a variable which would prevent a just comparison between results obtained at different works, or even at the same works in different seasons. That variable is the minimum temperature to which the test gas has been subjected. As the present endeavour is to put the photometry of gas upon a scientific basis, where just comparisons can be made, it would seem both desirable and necessary to secure control of this point of minimum temperature, and eliminate it as a variable. There may be examples to the contrary, as in the case of the Beckton works already cited, where the sampled gas on its way to the small storage holders is at one point exposed openly to atmospheric changes. While it cannot of a certainty be claimed that the sample in this instance is subjected to the identical temperature that the main body of the gas must meet on its way to the consumer, yet the tendency is in the same direction; and the operation of the works to meet the candle power requirements at city testing-stations is thus, through the works' readings, automatically guarded against the variation in illuminating value which might be expected through change of season or weather after the gas leaves the station meters. If minimum temperature control is had by means of cooling coils, the question arises: "What temperature shall be selected as the normal for all comparisons?" Would not 60° Fahr. seem to be the desirable selection; thus making the correction for both quality and quantity conform to the same standard?

Selection of Standards.

(3) In the report of the Committee describing the different standards in current use, there seemed no doubt that the pentane lamp came nearest to fulfilling the requirements of a reference standard for the photometry of gas. It is of the same colour and order of intensity as gas-flames; it is the equal of any flame standard in reproducibility; it is portable; it is easily operated; it has an international reputation, and has been the subject of international comparisons; in the home of its origin it is sanctioned as a legal multiple successor of the parliamentary candle; and it does not interpose any glass chimney between its light and the object illuminated.

The chief requisite of a reference standard is reproducibility. As indicating the closeness with which different lamps of English manufacture agree in this respect, I may refer to the report of the Director of the National Physical Laboratory, Dr. Glazebrook, to the Institution of Gas Engineers, which was also used before the Zürich Commission in 1907.* Our experience with the American-made lamps has not shown them to be in such close agreement as to reproducibility; but these lamps have been altered in some respects from the English design. Still, no reason exists why an American lamp, once assigned a value, shall not continue to reproduce that value, and in so doing constitute a very satisfactory reference standard. As reference standards will be expected to derive their values from the Bureau of Standards at Washington, it seems to me the Institute should recommend the adoption of the pentane lamp, with a Bureau of Standards evaluation, as the best present reference standard for gas testing in America.

It may be another question, however, to expect to secure the general adoption of the pentane lamp as a working standard, on account of the expense in fuel and the difficulty of its shipment; so that we should endeavour to find a cheaper standard for this purpose, bearing always in mind that it is necessary to furnish an independent fuel supply to it, and that it can be standardized as often as need be against the reference standard on hand, and that the variation in its value from atmospheric causes should be the same as with the gas-flame. Such a successful working standard is the Edgerton, when its gas is stored in a saturated holder and maintained at approximately a uniform temperature.

No allusion has been made to the candle, either as a reference or a working standard. It has been a good friend, and has served its purpose as a standard; but the time has come when it must give way to others more easy to operate and more exact in value. The candle is being used to-day more than ever before for certain purposes of illumination; but as a standard of light its usefulness is outworn, and it must retire to the companionship of the quill pen and the spinning-wheel.

What Constitutes a Test-Burner?

(4) Having discussed light standards, what shall we now say of the other end of the photometer? In the list of questions sent out last year by the Committee to the larger gas companies of America was one asking what test-burner was in use. In American photometry various burners are used—viz., 6, 7, and 8 feet E. H., 7-feet L. P. Bray, 8-feet H. P. Bray, 8-feet L. P. union-jet Bray, Laubach and Hilpert E. H. No. 5 union-jet Bray, 6-feet L. P. Bray special, 6-feet Sugg table-top, and, among the argands, Sugg D old and new, Sugg E, Sugg F, and the "Metropolitan" No. 2. It is quite certain that between the worst and the best of the burners mentioned there is a difference in efficiency of 20 per cent. This chaotic condition with regard to a standard burner through which to test gas is quite in keeping with the retention of the old candle for a standard light.

In the President's address last year, he said: "It is possible, by the exercise of care and deliberation, to so place this Institute that it will be universally recognized as an authority to which appeals may be made with confidence that scientific accuracy and perfect justice will characterize its decisions." I think the members of the Institute continue to feel that sentiment. We are thus impelled to the hope that, in furtherance of the thought expressed in the address, it will publish a set of rules on the photometry of gas. When such a set is made, it will be necessary to mention a standard test burner. Now that the day has arrived when we have a self-luminous burner, constructed on scientific principles, such as the Carpenter burner, the logical action of the Institute, in specifying a test-burner, will be to go at least so far as to designate such a type—not as a final action, but as the best that is now in sight; for the principle involved is that, in testing for illuminating power, the gas is entitled to the burner of the self-luminous type (as distinguished from the incandescent type) best suited to the gas, and used in the way most favourable for the gas, provided it is one which consumers may obtain and use as they wish.

The Future of Photometry.

(5) America is the land of raw materials, wasted bye-products, and therefore of opportunity. If coal is a natural resource, so is the gas that results from it. And if one cubic foot of gas properly utilized will produce a certain effect, is there not a guilty waste when 5 cubic feet are spent in producing it? The effect we have in mind is illuminative effect. In the future we shall not ask to look directly at a light source and measure its initial rays, we shall ask that the rays shall fall upon certain objects first, and then come reflected from those objects to our eyes. If the reflected light is sufficient, the objects are illuminated properly; and this shall be our inquiry. Once a beginning is made in measuring illumination—the effect, and not the candle power, the cause—we shall fall away from all quarrels as to whether a light from gas is given through a flat-flame, an argand, or a mantle burner. We shall adopt the burner and the method which, while giving complete satisfaction to the consumer, shall be most economical to us. This at present points to the use of mantle burners, and indicates the first conservation of our energy.

Two thoughts follow the above conclusion, and indicate the direction our investigations should take in the lighting field of the gas industry: (1) We should study the placing and directing of our lighting energy in order to produce a required illumination at the least cost. This is illuminating engineering. (2) We should study the quality and form of mantles, and the conforming of mantle shapes to flame shapes. Here we find a continued use for our elderly handmaiden, photometry. Should not we, as a Gas Institute, have a Committee working along these lines of investigation, as is done in foreign countries? And should we not now make sure that we have representatives at the next International Commission meeting in Zürich, in July, 1910, charged with bringing home to the Institute the beneficial results of their contact and exchange of thought on these subjects with the best men in Europe?

* See "Journal," Vol. XCIX., p. 232.

The Yorkshire Junior Gas Association will meet next Saturday at the Leeds Institute, when a paper will be read by Mr. W. Walker Atley, on "Coal Carbonizing for Bye-Products, &c."

The Manchester and District Junior Gas Association will meet at the Technical School, Manchester, next Saturday. The afternoon will be occupied by answering various questions sent to the Hon. Secretary (Mr. J. Alsop).

Scottish Junior Gas Association (Western District).—On Saturday next an ordinary meeting of the Association will be held in the Glasgow and West of Scotland Technical College, when Mr. James M'Ghee, of Glasgow, will read a paper entitled "Heating and Lighting."

Recent Wills.—The late Mr. Caleb Rickman Kemp, the Chairman of the Lewes Gas Company, whose death was recorded in the "Journal" for the 6th of October, left estate valued at £48,510. Mr. E. Tilley Lambert, the Chairman of the Tuscan Gas Company, left £99,700.

Reinforced Concrete.—This was the subject of a paper read by Mr. C. F. Marsh, Assistant-Engineer to the Metropolitan Water Board, at the first general meeting of the Concrete Institute, which was held recently at the Royal United Service Institution. The author expressed the opinion that this method of construction was not, and could not be, divided up into defined systems—it must be adapted to the requirements of each case in the best manner possible; and while all honour was due to those men who, as proprietors of the various systems, had undoubtedly "borne the burden and heat of the day," it was to be sincerely hoped that they would not try to hinder the advancement of this very excellent method of construction by any petty disputes, but would come to take a broad view of the whole question. He was sure that it would be to the great advantage of all concerned when the various systems were merged into one, and reinforced concrete took its proper place as a method of construction which, by reason of its great adaptability, could be employed for a vast number of different types of construction. It was certain that there would be no lack of work for specialists if this broader view were taken, and they undertook the design and construction of works in reinforced concrete without restricting themselves to their one particular system.

OLDHAM AND ITS GAS SUPPLY.

THE HIGGINSHAW AND HOLLINWOOD STATIONS OF THE CORPORATION AND THEIR CONSTRUCTIONAL DETAILS.

By T. Duxbury, Engineer.

[Prepared for the Meeting last Saturday of the Manchester District Institution of Gas Engineers.]

The manufacture of gas in Oldham for public lighting was commenced in 1827, under parliamentary powers granted to the Oldham Gas-Light and Water-Works Company in 1825; the Act stipulating that the light supplied was to be better and cheaper than oil. The price at that period was 10s. to 12s. 6d. per 1000 cubic feet. The undertaking was acquired by the Corporation in 1853. All the shares in the Company were converted into annuities of £1 per annum for each share; and there being 10,000 shares, the charge consequently incurred by the Corporation was £10,000 per annum.

The gas-stations at this period were situated at Oldham, Lees Brook, Shaw, Royton, and Hollinwood; and the price charged for gas was 3s. 4d. to 4s. 6d. per 1000 cubic feet. The quantity made during the first year (1854) was 106,444,800 cubic feet; and the number of consumers was 2170. The Lees Brook works ceased to be used as a manufacturing station in 1861; and the Shaw works were discarded in 1871, in which year the Higginshaw works came into use. The Royton works, with an annual make of 50,000,000 cubic feet, ceased to be used in 1907; a new 24-inch main being laid from the Hollinwood district to supply Royton.

The growth of the undertaking is shown by comparing the quantity of gas made, the number of consumers, and the capital value in 1854 and 1908 respectively:—

	1854.		1908.
Gas made, cubic feet . .	106,444,800	..	1,471,434,000
Number of consumers . .	2,170	..	45,531
Capital expended . . .	£69,155	..	£606,687
Average price realized per 1000 cubic feet . . .	3s. 11d.	..	1s. 11½d.

During this period, profits amounting in the aggregate to £390,000 have been utilized in aiding the rates of the town, in addition to gratuitous gas amounting to £158,000—making altogether £548,000. The excess of assets over the liabilities of the undertaking on the 25th of March last was £369,993.

The total daily productive capacity of all the works is 11,000,000 cubic feet, including 1,000,000 cubic feet of carburetted water gas. The maximum gas delivery in 24 hours is 8,634,000 cubic feet. The total gasholder storage is 6,400,000 cubic feet. The gas-mains are so connected by means of valves as to be of assistance to each other during foggy weather. The statutory illuminating power is 14 candles; but the actual quality supplied averages over 20 candles with a No. 2 "Metropolitan" burner. The population of the gas supply district is about 230,000; and the number of houses, &c., connected with the mains is about 50,000. All gas used for municipal buildings and street lighting within the borough, amounting to 88,000,000 cubic feet per annum, is supplied free. Outside local authorities are charged 1s. 11d. per 1000 cubic feet for street lighting.

The public lighting within the municipal borough is under the control of the Gas Committee. All the main thoroughfares within the municipal borough are now lighted by burners of the incandescent type; and this system is being rapidly extended throughout the whole borough. Out of a total of 3850 street-lamps, 2300 are fitted with incandescent burners. Keith's system of high-pressure lighting was installed in front of the Town Hall some seven years ago; and self-intensified lamps are fixed in many other parts of the borough.

In 1886, the differential rate of 2d. per 1000 cubic feet charged for gas supplied to the out-townships was abolished by Act of Parliament; and the profits which may be used for assisting the rates were limited to 6 per cent. on the amount of borrowed capital, out of which sum the interest and redemption fund charges have to be paid. The area of the municipal borough of Oldham is 4279 acres; but the total area of the gas supply district is 16,157 acres, in which are included the following townships: Oldham, Failsworth, Chadderton, Royton, Crompton, Springhead, Lees, Crossbank, Alt Edge. The altitude varies from 250 feet to over 1100 feet above sea-level. The gas and water works were combined, both as regards management and finances, until 1876, when the departments were separated, and two Committees were appointed, to control each of the undertakings.

Particulars respecting each of the existing works are appended.

Oldham Gas-Station.

These works, which date from 1826, are connected with the Lancashire and Yorkshire Railway, and have a productive capacity of 1,000,000 cubic feet per day. There are three gasholders, having a combined storage of 980,000 cubic feet. All the retorts are on the direct-fired principle; and all stoking is done by manual labour. Machinery is used for breaking, elevating, and storing coal. These works are used for gas-making purposes during six months in the year—September to March. There is also a complete coal-testing plant at these works, carbonizing about 350 tons of coal per annum. The central store rooms, pipe yards, and workshops are located at this station, and also the general offices.

Higginshaw Gas-Station.

These works were opened in 1871; and prior to the recent extensions, al lthe retorts were direct-fired with hand stoking. There is a private siding connected with the Lancashire and Yorkshire Railway Company's main line; and two locomotives belonging to the Gas Department are used for dealing with the traffic on these sidings.

The first set of machinery for unloading and storing coal was installed in 1890. One end of the coal-waggon is lifted by a powerful overhead hoisting grab, supported by strong cast-iron columns and steel girders. Either end of the waggon may be lifted. The contents fall into a large hopper and pass through a coal-breaker capable of dealing with over 40 tons of coal per hour, where it is broken into a suitable size for power stoking machinery. The coal is elevated by the usual type of bucket elevators, and is conveyed the whole length of the coal-stores by means of canvas band or belt conveyors, and deposited at any point of the store by means of a travelling tipping-carriage, which runs along the conveyor.

No. 1 coal-handling plant, erected in 1890, is driven by two steam-engines; and No. 2 plant, erected in 1902, by two gas-engines, each about 44 I.H.P., fixed underground near the coal-breaker—the machinery being so arranged that either gas-engine will drive either plant. There are four sets of breaking, elevating, and conveying plants, each capable of handling 360 tons of coal per working day of nine hours. This plant is in duplicate, and each section is entirely independent of the other, so that all the coal-store area can be covered. There are three coal-stores each of a capacity of 4000 tons, or a total storage of 12,000 tons.

Retort-Houses.

No. 1 contains 20 through settings of sixes, or 240 mouthpieces.
„ 2 „ 20 „ „ „ 240 „
„ 3 „ 19 „ „ eights, or 304 „

The retorts in Nos. 1 and 2 houses are 22 in. by 16 in. by 20 ft. through, built with fire-bricks and tiles, and are direct-fired with hand stoking. Each stoker carbonizes 63 cwt. of coal per eight-hour shift—four-hour charges of 1¾ cwt. Furnace men and coal and coke wheelers are provided in addition. Each of these two houses will carbonize 126 tons of coal per day; and they are only partially used for about three months in mid-winter.

No. 3 retort-house, erected in 1902, is 220 feet long by 68 feet wide; and the retorts are heated on the regenerative principle. The settings were erected by West's Gas Improvement Company. Each retort is 20 feet long through, by 22 in. by 16 in., and capable of carbonizing 30 cwt. of coal per day, with six-hour charges. The whole house, containing nineteen through settings of eights, will carbonize 220 tons per day; the productive capacity being 2,500,000 cubic feet of gas per day, or about equivalent to the two other houses of forty settings. No. 3 house is fitted with the usual tar-flushing towers, &c.; and four Braddock retort-house governors are now being fixed.

The total capacity of all three houses is over 5,000,000 cubic feet of gas per day; and the make of gas at these works for the year ended March last was 739,620,000 cubic feet.

Stoking Machinery.*

No. 3 retort-house is fitted with West's compressed air single drawing and charging machines; and on one side of the house there are two elevators which elevate the broken coal from the coal-stores and deliver into hoppers, capable of holding 10 tons each, which are fixed overhead on girders supported in the walls at one end and on the retort-bench at the other. There are four hoppers, two on each side of the house. The two hoppers on the opposite side of the retort-stack to the elevators are filled by means of a band-conveyor, which carries the coal across the stack from the elevator-head. The elevators from the coal-store are protected by large steel shields, so that the coal can be heaped up against the shields—thus providing a large heap of coal which is delivered to the elevator without trimming, through doors at the foot of the shields. These doors are easily operated from the other side by means of hand-wheels and gearing, which opens or closes the doors as required. The elevators and conveyors across the stack are driven from steam-engines which are placed at the foot of the elevators, and covered in, in order to keep the dust and grit out of the bearings as much as possible.

Each charging-machine receives the supply of coal from the overhead hoppers. It is carried in an adjustable hopper supported by chains from the top of the frame; and the hopper can be raised or lowered to suit the various tiers of retorts by means of gearing worked by the same motor that propels the machine. The hopper on each machine for carrying the supply of coal for the charger is provided with a feeder-box controlled by a hand-

* An illustrated description of this plant appeared in the "Journal" for Oct. 28, 1902, pp. 1141-44; also "Journal" for Oct. 23, 1906, pp. 235-37.

wheel for regulating the amount of the charge. The charger, which enters the retorts with the coal, is carried in a frame suspended below the hopper, and is driven in and out of the retorts by a compressed-air cylinder, rack and pinion, chain-drums, and chains. The charger is a very important part of the apparatus, and has all the movements for charging the retorts properly; the mechanism being protected from the coal dust by a cover. The charger consists of a scoop as well as a carriage containing the mechanism for emptying the coal out of the scoop and righting itself for a fresh supply.

It is also arranged that the scoop shall enter the retorts twice in order to make a complete charge, first turning over in one direction and next in the other; thus throwing the coal towards the right and left hand sides of the retort respectively. The scoop is entirely suspended by its carriage, and does not at any time rest on the retorts. The coal is left in the retorts in an even layer, and in most suitable conditions for producing a larger volume of gas in less time than on the old system. The drawing-machine is fitted with a motor and travelling gear, and also a gear for hoisting and lowering the rake-bar to the several tiers of retorts. The machine is fitted with an automatic controlling arrangement for the air-cylinder; and the rake-head is driven into and out of the retorts by means of chains connected to a rack and pinion worked by the air-cylinder, which is fully under the control of the attendant, who also can raise or depress the rake-head over, or into, the coke by means of a hand-lever. A tank containing water is carried on each machine for the purpose of cooling the rake-head.

The charging and drawing machines are worked by means of compressed air supplied by an air-compressor fixed in a building outside the retort-house. The air-compressor has many special features and improvements for compressing air with the smallest possible expenditure of steam. The type of compressor at these works is that known as the "double line," in which there are two steam-cylinders in tandem with the air-cylinders. The steam-cylinders are steam jacketed and lagged; and all bearings are of extra proportion to minimize the wear and tear and the repairs under the conditions of running day and night. The air-cylinders are of two sizes, and do the work of compressing in two stages; and between the two stages there is a cooler to take out the heat developed by the compression in the low-pressure cylinder. In addition to these, each cylinder is fitted with a jacket provided with water for cooling.

The suction and delivery valves have a positive action, controlled by cams on a revolving shaft, so that the valves may have large areas and wide openings in order to prevent wire-drawing and friction of air, and yet be well under control to obviate detrimental shocks. The compressor is fitted with an automatic arrangement for reducing the speed of the engine when the compressed air in the receiver has attained its maximum pressure, and restarting the engine at its full speed as soon as the pressure falls. After the air is compressed, it is delivered and stored in a cylindrical receiver, to which are attached the pipes leading into the retort-house. The air is conveyed from the receiver through iron pipes to the hose-drums, fitted to the girders carrying the overhead coal-hoppers for supplying the charging-machines with coal. There is a large hose-drum, complete with all fittings, for each of the charging and drawing machines.

A long length of flexible hose is attached to each of these drums at one end, and at the other end to the machine, which is supplied from it. Each drum is provided with a hollow shaft through which the air is furnished; and by an arrangement of gun-metal swivel-joints, the air is supplied to the hose on the drums while they revolve. On each of the hose-drum shafts a chain-drum is keyed. A chain attached to this leads over the pulleys fixed in the retort-house roof, having weights at the other end, which rise and fall as the hose is automatically paid out and in by the machines. The hose leading from the drums to the machines is specially constructed for conveying air, and is supported at intervals by suspending brackets and rollers, so that the strain on the hose is very light. The whole arrangement is so automatic that it requires no attention on the part of the attendant while travelling the machines the whole length of the retort-house. These compressors also supply the necessary air for working capstans in various parts of the works.

The coke, on being drawn from the retorts, falls into a West's hot-coke conveyor trough below the stage-floor, where it is quenched and carried outside the retort-house to iron skips and overhead coke-hoppers. These conveyors are worked by a 12 H.P. steam-engine. The iron coke-skips are carried away by a travelling crane to four revolving screens driven by a 6 H.P. gas-engine, where the coke is separated; the nuts and breeze falling into separate hoppers for loading into carts and railway waggons.

Boilers.

There are two Lancashire steam-boilers, each 24 ft. by 7 ft., and 60 lbs. pressure, which provide steam for the exhausters, pumps, and mechanics' and blacksmiths' shops; also two Lancashire boilers, each 28 ft. by 7 ft., and 80 lb. pressure, which provide steam for the air-compressors, benzol carburettor, &c. All the boilers are by the Oldham Boiler Works Company, and are fitted with Wilton's furnaces. Coke breeze is used as fuel.

Condenser.

The condenser erected in 1905 is of the Clapham "Eclipse" water-tube type, having a capacity of 3,000,000 cubic feet per day. The condenser is divided vertically through its height by central division-plates; each of the three sections being subdivided into three chambers—viz., a water-chamber at the top and bottom, with a gas-chamber between. Through the latter pass the water-tubes, which are $1\frac{3}{8}$ inches external diameter, and of which there are about $3\frac{1}{2}$ miles in length. The tube-joints are made by Clapham's patent arrangement of stuffing-boxes and glands, which allows of the removal and replacement of any tube without disturbing the remainder. The gas flows through each section downwards, the water upwards, and in the reverse direction; consequently, as the gas is cooled, it always comes in contact with the tubes containing cold water.

Exhausters.

The four vertical exhausters are of the Anderson type; and the capacity of each is 60,000 cubic feet per hour, or a total capacity of 5,750,000 cubic feet per day.

Tower Scrubbers.

The two scrubbers on the inlet-side of the exhauster are not now used as scrubbers, since the erection of the condensers. The eight 30 ft. by 8 ft. scrubbers on the outlet-side of the exhausters are worked in pairs, and are filled with wood grids. There is an underground tar and liquor well, 80 ft. by 57 ft. by 13 ft. deep, having a capacity of 350,000 gallons.

Washer-Scrubber.

A 3,000,000 cubic feet per day Holmes washer-scrubber, exactly similar to the one described for the Hollinwood works, has recently been added for the extraction of ammonia.

Naphthalene-Washer.

A 2,000,000 cubic feet per day Livesey washer has been fixed on the inlet of the purifiers, for the purpose of dealing with the naphthalene trouble, which had become very acute. "Derby" solvene is used, at the rate of one-fifth of a gallon per ton of coal carbonized from April to October inclusive, and one-tenth of a gallon per ton of coal from November to March inclusive. This has proved most effective, as the following figures will show: The total number of service-pipes stopped or partially stopped with naphthalene for twelve months prior to using solvene was about 2000; and the total number for the past ten months was 30. The total number of public lamps extinguished through naphthalene within the borough for twelve months prior to using solvene was over 10,000; and the total number for the past nine months was 129.

Purifiers.

There are eight ordinary water-lute purifiers, each 20 ft. by 20 ft. by 4 ft. deep, arranged in two sets, with 20-inch centre-valves. One set is filled with Cutler's hurdle grids, and the other set with ordinary grids. New purifiers and house are now in course of erection by Messrs. R. Dempster and Sons, of Elland. The house will be constructed of steel work throughout, with slated roof, and grillage foundations. The vertical stanchions are 38 feet long, to be composed of two rolled steel channels, each 10 in. by $3\frac{1}{2}$ in., compounded with two 12 in. by $\frac{5}{8}$ in. steel flats, with base plates 2 feet square by $\frac{3}{4}$ inch thick. The main transverse girders are to be 16 in. by 6 in., compounded with two steel flats each 10 in. by $\frac{5}{8}$ in. in 57 feet lengths, and the cross girders to be 12 in. by 6 in. The total length of the house will be 72 feet by 58 feet wide. The roof will consist of eight steel roof principals of the Fink truss type.

The purifiers will be Green's luteless type, 70 feet long by 56 feet wide by 6 feet deep, divided into four boxes by means of cast-iron division-plates, having eight steel covers, each 22 feet by 13 ft. 6 in. for the four boxes. The purifiers will be worked by Messrs. R. Dempster & Sons' 24-inch connectionless Weck's centre-valve; and the covers will be fitted with Green's patent leak-detector. It is proposed to work these purifiers with ordinary grids; the gas entering midway between the two layers of oxide. Each purifier will hold 450 tons of oxide, which will be elevated by means of a friction hoist and skips similar to those at Hollinwood. The combined capacity of these four new purifiers will be just double that of the eight existing ones.

Station-Meters.

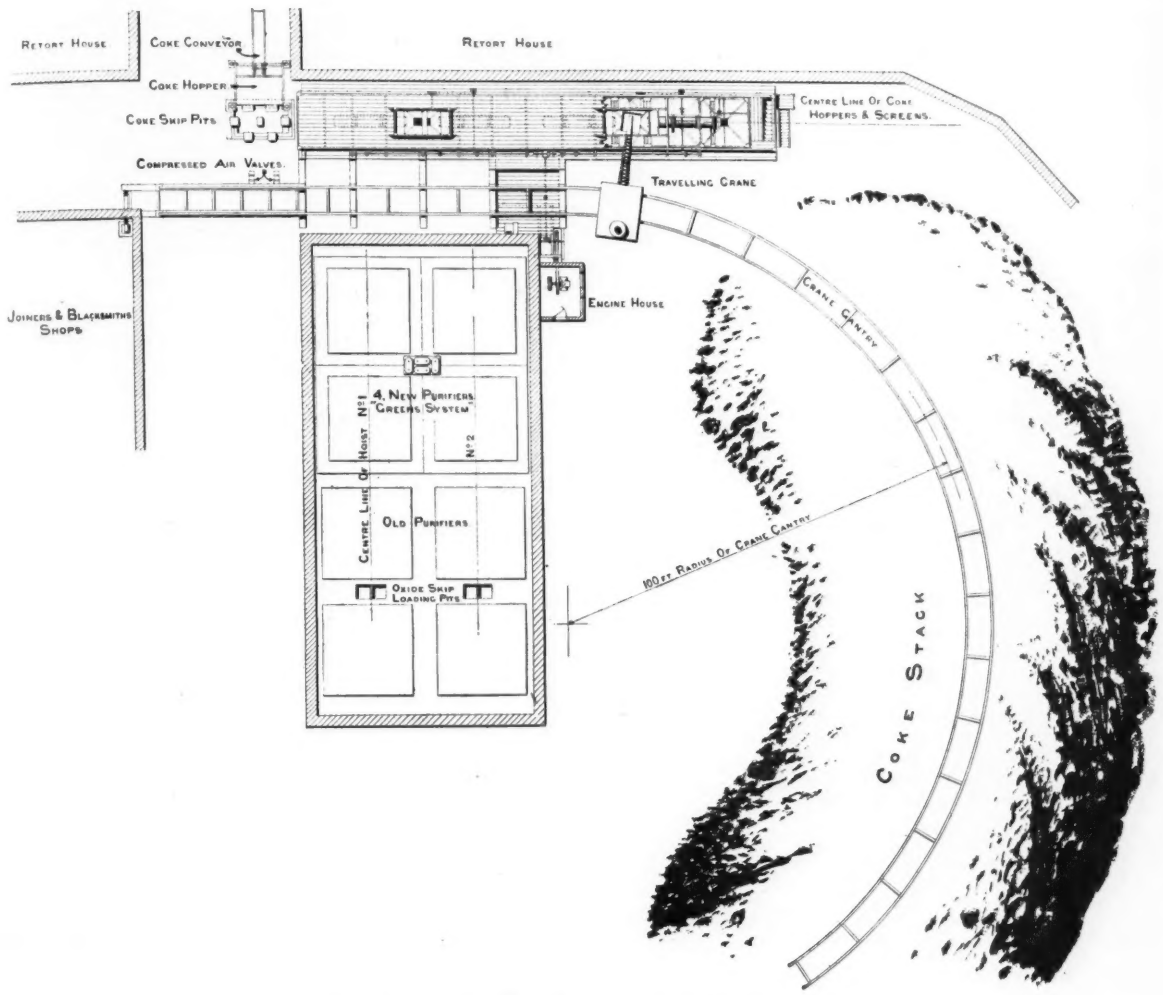
There are two station-meters at these works—No. 1, George Newton; capacity, 60,000 cubic feet per hour. No. 2, J. & J. Braddock; capacity, 100,000 cubic feet per hour.

Carburettor.

A Maxim-Clark benzol carburettor, capable of enriching 200,000 cubic feet of gas per hour by 1-candle power, or 100,000 cubic feet by 2 candles, is fixed on the gasholder inlet; the gas being enriched throughout the whole 24 hours, at a cost for benzol of less than 0·5d. per candle per 1000 cubic feet of gas. From 1 to 2 candles enrichment is added.

Holders.

There are four gasholders each having a storage capacity of 400,000 cubic feet, and one having a capacity exactly equal to the four—1,600,000 cubic feet. The total capacity is 3,200,000 cubic feet, and the maximum gas delivered 3,924,000 cubic feet in 24 hours. It is proposed to add three more lifts to the large holder, thereby increasing its capacity by 2,250,000 cubic feet.



Plan of the Coke Handling Plant at the Hollinwood Gas-Works.

STATION-GOVERNORS.

These are Newton's make, and are of the ordinary type; pressure being put on and taken off by means of weights. The larger one is a 24-inch, and supplies part of Oldham; and the smaller one, an 18-inch, supplies the out-townships of Crompton and part of Royton. Extensions are contemplated here, as these governors are now too small. A safety governor is not necessary at these works, as the mains are always open to the holders at the central works.

GENERAL.

A new mechanics' shop, blacksmiths' shop, stokers' dining-room, and lavatories are in course of erection at these works. The Corporation are now applying to Parliament for powers to erect tar and ammonia distillation works at this station, owing to their inability to obtain satisfactory competitive tenders for their tar and ammoniacal liquor.

Hollinwood Gas-Station.

This station is situated on the banks of the Manchester and Ashton-under-Lyne Canal, but has no railway sidings, consequently all the coal, coke, &c., has to be carted into the works. The total daily productive capacity is 3,500,000 cubic feet of coal gas and 1,000,000 cubic feet of carburetted water gas per day. There are three retort-houses. The old house, situated on the easterly side of the canal, which contains fifteen through settings of threes, direct-fired, is now disused and partially dismantled, and is about to be employed as a shooting range by the members of the Oldham Municipal Officers' Guild. The present works on the west side of the canal were first brought into use in 1873. Up to three years ago, all the retorts at this works were direct-fired, with hand stoking.

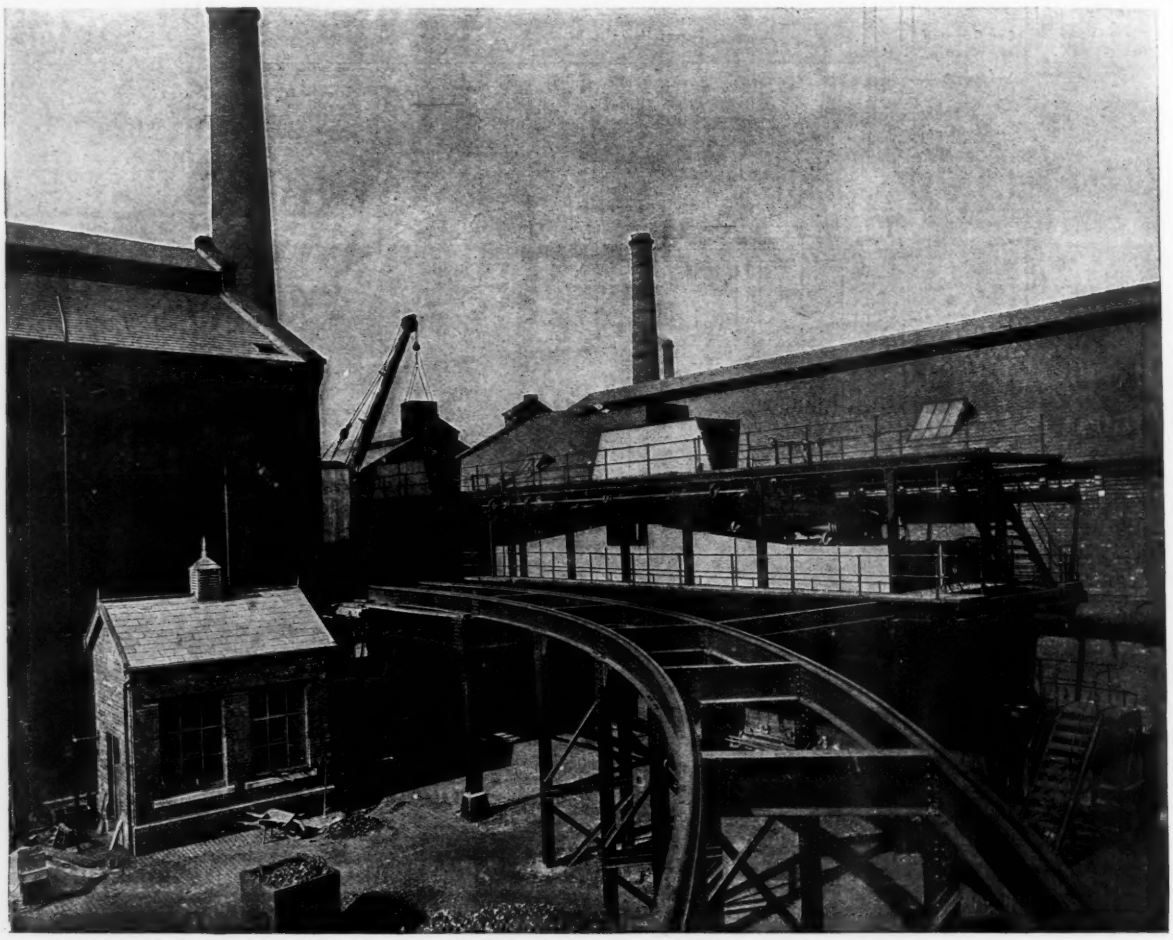
RETORT-HOUSES AND COAL-STORE.

No. 1 retort-house has now been entirely remodelled, and the twenty direct-fired settings, with a capacity of 1,000,000 cubic feet per day, have given place to sixteen through settings, with regenerative furnaces, Waddell's tubes, and stoking machinery, having a daily productive capacity of over 2,000,000 cubic feet. The first eight settings were erected in 1906; and so successful were they that the remaining eight were put up in the following year—thus making the house complete, and increasing its carbonizing capacity by 100 per cent. on the same ground area. The coal is delivered by carts (or by canal) into a hopper, which is fitted with a jigger for feeding the coal to the breaker below, and is broken to a size suitable for the West charging-machine. The coal is here elevated by the usual type of bucket-elevator, and delivered on to a band-conveyor 2 feet wide, provided with a travelling carriage for throwing the coal off at any desired point in the store. This plant is driven by a 34 B.H.P. gas-engine fixed in a house adjoining the breaker-pit. The capacity of this plant is 30 tons of coal per hour.

No. 1 coal-store has a capacity of 4500 tons, and No. 2 store 5000 tons. Two bucket-elevators are provided from the coal-store to the overhead hoppers in the retort-house, and two band-conveyors for carrying the broken coal across the retort-stack to hoppers on the opposite of the house. The elevators and engines are shielded from the coal stored over the elevator-boot; the coal feed to same being regulated by an adjustable door. There are four overhead coal-hoppers in the retort-house, each having a capacity of 10 tons, for feeding the charging-machines.

There are eight retorts, 22 in. by 16 in. by 20 ft., in each setting; and, as the retort-house walls were only 27 ft. 6 in. high, instead of raising the roof, the coke vault floor has been excavated to a depth of 4 feet below the yard level, and the stage-floor is 6 feet above the yard level. The old chimney was left standing; and the new settings were connected thereto. The retorts are of special section to suit the West double charging-scoop. There is a separate hydraulic main to each single setting, with the usual seal-valves, foul-mains, tar-mains, &c. Special provision is made for cleaning out the hydraulic mains by means of doors fixed at the back of them, thereby enabling any obstruction to be removed while the hydraulic main is at work. In order to ensure a water-seal, tar-flushing towers have been fixed; and the tar is drawn off every two hours—viz., immediately after each draw. A 20-inch steel riveted foul-main is carried round three sides of the retort-house, and is arranged with valves whereby either bench can be shut off from the other, or, if desired, they can be worked in unison with each other. The stage-floors are composed of rolled steel joists, with cement concrete arches, further strengthened by expanded metal meshing; and the floor is paved with blue-chequered bricks. As the retort-house is only 60 feet wide, and barely wide enough for the West machine, a platform 2 feet wide has been arranged outside the house for passing purposes. The whole of the above work was carried out by Messrs. R. Dempster and Sons.

These retorts are worked by West's combined charging and drawing compressed-air machines, which have already been described at the Higginshaw works; the great difference being that one man performs the drawing and charging, instead of the



Coke Gantry, Hoppers, Etc., at Hollinwood.

two men necessary for the single machines—thereby dispensing with six men per day for a retort-house containing sixteen through settings, and saving £600 per annum in wages. The West charging and drawing machines are provided with motors driven by compressed air for travelling the machines along the retort-house, and hoisting and adjusting the rakes and chargers, which are of the latest and most improved type—the latter depositing the coal in the retort at one operation. Over 3½ cwt. of coal is put in by each machine, or 7¼ cwt. per through retort, with six-hour charges. The air-compressor and receiver is fixed in the exhauster-house; the air being conveyed through wrought-iron pipes, which in the retort-house are connected to drums fixed overhead, and fitted with flexible tubes leading to the machines. These drums are fitted with automatic gear for winding the flexible tube on to the drums as the machines travel along the retort-house. The air-compressor is of West's latest type, with a steam-engine arranged tandem with the air-cylinders. An automatic speed regulator, operated by the air pressure, is fitted to the compressor for slowing the speed when the compressor is not required on full work; the air pressure needed being 60 to 70 lbs. per square inch.

The coke, when drawn from the retorts, falls down a shoot into a West hot-coke conveyor fixed below the stage-floor; and each conveyor on leaving the retort-house rises up an incline to enable the coke to be delivered into a cross conveyor for filling the hopper, which is fitted with outlets for supplying the crane-skips of the overhead coke conveying and storing plant. The coke-conveyors are driven by a 12-H.P. horizontal steam-engine. Provision is made for quenching the coke with canal water while in the conveyor-trough. The conveyor chain is similar to the one at Higginshaw. The whole of the stoking machinery, breakers, elevators, conveyors, and hot-coke conveyors were erected by West's Gas Improvement Company.

No. 3 retort-house contains twenty-four through settings of sixes, or 288 mouthpieces, direct-fired, with hand stoking. These retorts are built with fire-bricks and tiles, and are 22 in. by 16 in. by 20 ft. through, and are partially used for about two months in mid-winter.

Retort-House Governors.

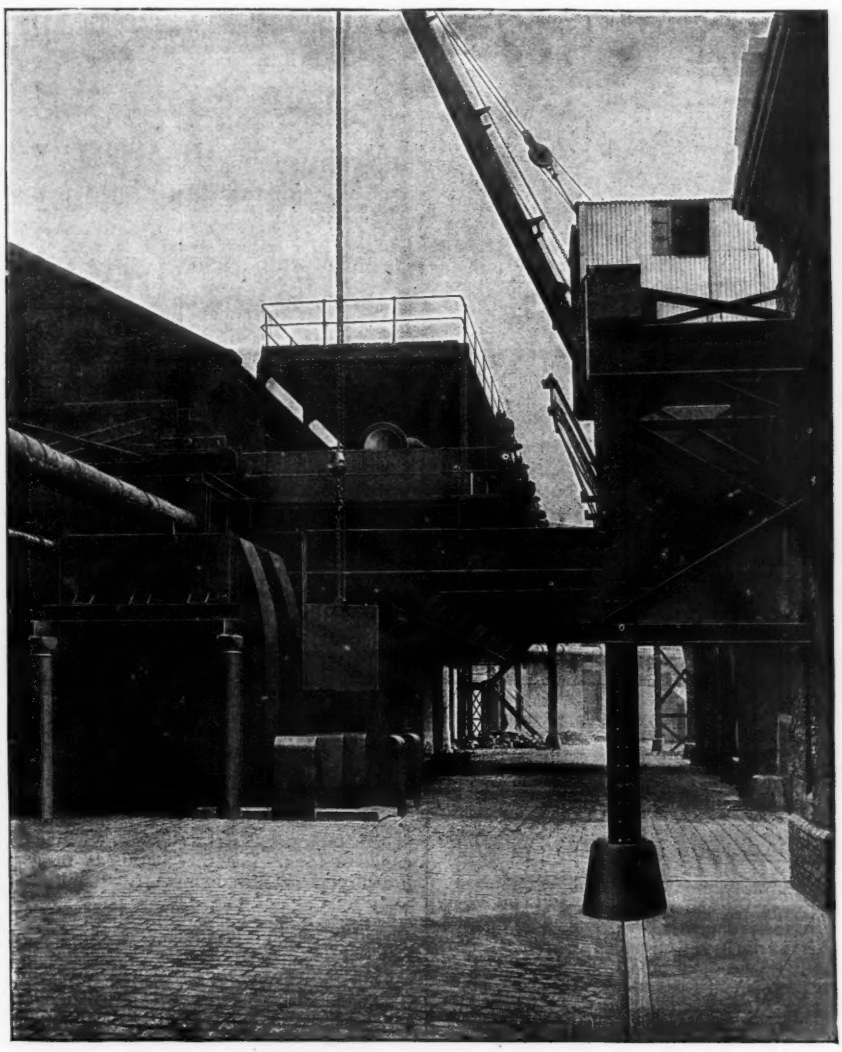
Four 10-inch Braddock's enclosed retort-house governors have recently been fixed, controlling the sixteen through settings, or 256 mouthpieces. These are arranged in pairs, so that the gas may be sent through both or either governor, should one be off for cleaning. Each governor is capable of dealing with the gas from 128 mouthpieces, and effectively maintains the most desirable conditions in the hydraulic main. The governors are totally enclosed; and the valves are arranged with parabolic openings, so that the travel is shortened, and the governors can instantaneously deal with any large variation in the volume of gas. The inner construction of the tank and bell is such that the deposit of tar is reduced to a minimum. This is an important factor in the construction of retort-house governors. Since the governors have been installed, they have fully justified the claims made for them: (1) The illuminating power of the gas is much more regular and reliable, with less anxiety for the exhauster man. (2) The maximum yield of gas per ton of coal is obtained.

Coke Handling and Screening Plant.

This plant, erected by Messrs. R. Dempster and Sons, is most extensive and complete, and comprises many interesting features tending to economy of working. The plant deals with the coke from the 128 through retorts. As there is no railway siding at these works, it is essential that accommodation should be made for storing 2000 to 3000 tons of coke in the yard; and provision is also made in the screen-hoppers for storing 50 tons of screened large coke, 30 tons of screened coke nuts, and 20 tons of coke breeze, for the purpose of quickly loading motor-lorries, carts, &c. The quenched coke from the retort-house is deposited in a steel coke-hopper; and immediately in front of this hopper are the coke-skip loading pits. The craneman lowers the skip in the pit; and by manipulating the valve-lever within reach from his position on the crane, he operates the outlet doors of the hopper, and fills the skip with a ton of coke. Having filled the skip, it is hoisted to the required height; and then by travelling the crane he can, without any slewing of the crane or hoisting of the jib, deliver coke to the screens, to the coke-stack, or into vehicles.

The steam travelling-crane was by Messrs. Thomas Smith and Sons, of Leeds, and has a 20-foot radius of action. It is mounted upon a steel gantry, 17 feet high and 350 feet long, and is therefore able to lift its load of 2 tons to a height of 40 feet from the ground. The craneman can handle coke from the coke-hopper to the screens or coke stack at the rate of 30 to 40 tons per hour; and the screening plant is sufficient to screen this amount. When taking from the stack at present, the coke is shovelled into spare skips, picked up, and taken to the screens by the craneman; but it is intended to finally complete the scheme by fitting the crane with a detachable grab. The skips have bottom doors capable of being operated by the craneman from his position on the crane. Thus the craneman can, without assistance, (1) feed the screens, (2) store the coke in the yard, (3) load vehicles, (4) grab the coke from the stack and deliver it to the screens.

The screening plant consists of four revolving screens, each having its parts interchangeable. The screens are each 2 ft. 6 in. diameter by 17 feet long, and are fitted at an inclination of 1 in 10,



Coke Hopper, Skips, Pits, Etc., at Hollinwood.

and rotated at sixteen revolutions per minute. The first mesh for coke breeze consists of 45 square feet of plate perforated with 1-inch diameter holes, and the second mesh for coke-nuts of 45 square feet of plate perforated with 2-inch diameter holes. Two of the screens in operation at these works are so arranged that the coke-nuts can be dispensed with; its place being taken by plates with curved outlet-doors. In order to ensure clean and uniform screening, it is necessary to regulate the flow of coke through the screen; hence each screen is fitted with Dempster's "Sure Feed," which, while working at only six strokes per minute, steadily but surely feeds the screens at a rate of 10 tons of coke per hour. The crane dumps the coke in 1-ton lots in the hopper over the feeds; but the feed regulates the coke into the screens at the above measured rate.

The complete screening plant is driven by the usual counter-shafts from a steam-engine, which also drives the hoists in the purifier-house. Each screen is fitted with a friction clutch, so that it can be started and stopped at will. The valves for operating the slide-doors for filling the coke-skips out of the coke-bunkers will be operated by means of compressed air, in preference to hydraulic power, to avoid trouble from frost in winter; and as there is compressed air on the works for operating the West machinery, this can be done with a minimum of trouble.

Steam-Boilers.

There are two Lancashire steam-boilers, each 30 ft. by 8 ft., and 100 lbs. steam pressure, fitted with Wilton's breeze furnaces. Either will supply the whole of the steam required for all gas-works purposes. These boilers displaced two smaller Lancashire boilers some three years ago.

Condensers.

These condensers were erected at the same time as those at the Higginshaw works, prior to which there was no proper form of condenser in use at either works. They are of exactly the same type in both cases, with the exception that, for convenience and uniformity in appearance, two 1,500,000 cubic feet sets were erected at Hollinwood instead of one 3,000,000 cubic feet set as at Higginshaw. The warm water from all the condensers is used for steam-boiler purposes. Prior to the erection of these condensers, the temperature of the gas at the station-meters was often 80° Fahr., and the ammoniacal liquor in the well was frequently 90° Fahr., causing a great loss of volatile ammonia. Three years ago the system of correcting all the gas made to 60° Fahr. was instituted.

Exhausters.

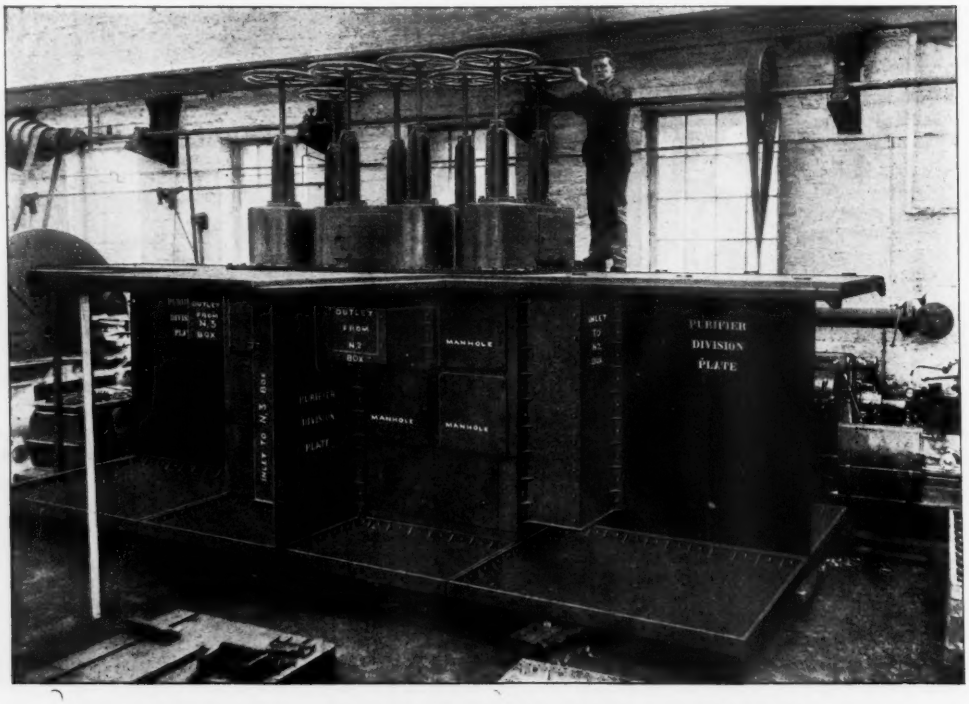
The two vertical exhausters are of the Anderson type; and the capacity of each is 60,000 cubic feet per hour, or a total of 2,750,000 cubic feet per day. As this left no margin in case of breakdown, a new rotary exhauster has been erected. It is of Waller's patent four blade "B" type, having engine and exhauster direct coupled. This exhauster is capable of dealing with 150,000 cubic feet of gas per hour, or 3,500,000 cubic feet a day, at 65 revolutions per minute, against 36 inches gas pressure on the outlet. The internal dimensions of the exhausters are 42 inches long by 42 inches diameter; four deliveries of gas being made per revolution, instead of two as in the ordinary Beale type. A much steadier gauge is therefore obtained. The engine is of the horizontal high-pressure type, 12 inches diameter by 18 inches stroke, designed for taking steam up to 100 lbs. pressure. The steam-regulator is designed for regulating the engine with a vacuum up to 4 inches; and the regulating valve is of Waller's latest type, being of the equilibrium pattern. Drawings are being prepared for a 4,000,000 cubic feet per day twin exhauster, to displace one of the existing vertical exhausters.

Tower Scrubbers.

The two scrubbers on the inlet of the exhauster are filled with wood grids; and the eight scrubbers on the exhauster outlet are worked in pairs, and are also filled with wood grids.

Washer-Scrubber.

A Holmes horizontal washer-scrubber has recently been added, capable of dealing with 3,000,000 cubic feet of gas per day, for the extraction of ammonia. The non-metallic scrubbing of this machine equals 36,306 square feet; the machine being 20 feet long by 9 feet diameter, and having 24-inch connections. To the iron revolving plates are fixed circular brushes, which, continually revolving, dip into the liquid in the lower portion of the several chambers, and supply the freshly-wetted surfaces through which the gas passes, breaking up the latter into minute streams, and arresting the ammonia. Between the washing chambers, and



Dempster's Patent Connectionless Weck's Valves at the Hollinwood Gas-Works.

separating them from one another, are the patent still chambers, with a weir to regulate the overflow of the liquor from chamber to chamber. Clean water is used for this machine. The steam-engine has 8-inch diameter cylinders, and 12-inch stroke.

Naphthalene-Washer.

A 2,000,000 cubic feet Livesey washer for dealing with naphthalene was erected at the same time as the one at Higginshaw. At these works various kinds of solvents have been experimented with during the last eighteen months; but as none of them have been entirely satisfactory, we have decided to use the "Derby" solvent in future, with the exception of a probable experiment with water-gas tar at some later date.

Purifiers.

There are four ordinary water-lute purifiers, each 20 feet square by 4 feet deep, which were fitted with Jager grids in 1905. In March last, four water-lute 16 feet square by 3 ft. 6 in. purifiers were taken out, and four new 25 feet square by 6 feet deep Green's purifiers erected in their place by Messrs. R. Dempster and Sons. These purifiers are fitted with Spencer's hurdle grids, and are operated by Messrs. Dempster's connectionless 24-inch Weck's valve, which is a very compact arrangement, with only one rising and one falling main inlet and main outlet gas-pipe underneath the purifiers without materially obstructing the capacity of the purifiers. The covers are fitted with Green's patent leak-detectors, which enable us at any time to make certain that the purifier-cover joints are perfectly tight.

The purifiers are filled with oxide of iron; and this is handled by means of friction hoists and skips. These hoists are fixed at one end of the house; and they hoist and traverse a monkey-carriage on overhead rolled steel joists. The skips are lowered through the floor into pits on the revivifying floor level, where they are filled and hoisted up clear of the top of the purifier, traversed to the desired position, and the oxide discharged into the purifier. Each skip will hold about 10 cwt., and is very easily hoisted and traversed about by the friction hoists. The whole of the operations of the hoist are controlled by one handle, which is placed about midway in the house, thereby enabling the operator to see everything that is going on from the filling of the skips on the lower level to the emptying of same into the purifiers. The power that drives these hoists is obtained from the same engine that drives the new coke-screening plant. The capacity of these four Green's purifiers is over four times that of the small purifiers taken out.

Station-Meters.

There are two station-meters, by J. & J. Braddock, each having a capacity of 60,000 cubic feet per hour.

Carburettor.

A Maxim-Clark benzol carburettor, capable of enriching 200,000 cubic feet of gas per hour by 1 candle, is fixed on the gasholder inlet; the gas being enriched throughout the whole 24 hours.

Holders.

There are four gasholders at these works (three of which have been enlarged from two to three lifts) each having a storage capacity of 600,000 cubic feet, one of which is rope-guided. The fourth holder, which is a two-lift, has a storage capacity of 400,000 cubic feet. The total storage capacity is only 2,200,000 cubic feet; and the maximum gas delivered in one day, 3,633,000 cubic feet. The Committee have decided to erect a new five-lift holder, 210 feet diameter, having a capacity of 4,500,000 cubic feet, with concrete tank. For this land has been purchased, and the drawings are almost completed.

Station-Governors.

Up to recently there were four station-governors of the ordinary type; the pressure being adjusted by means of weights. Two of these have been displaced by one 30-inch and one 18-inch Braddock patent counterbalance governors, fitted with water-loading arrangements. Owing to the very limited space, these governors are arranged with two parabolic valves fixed on one spindle.

Safety Governor.

At the opposite end of the governor-house has been fixed an 18-inch Braddock counterbalance safety governor. This is connected from the station-meter outlet main to the outlet trunk main of the station-governor, and is adjusted to come into action the moment the pressure in the trunk main falls below that given by the lightest gasholder. This is a most effective safeguard against having the town plunged into darkness should the valve-man close the wrong holder-valve.

A new dining-room, bathroom, and lavatories have recently been erected for the workmen's convenience; and the old dining-room is now used as a mechanics' shop.

Carburetted Water Gas.

This plant has a productive capacity of 1,000,000 cubic feet per day, with preparations left for another 500,000 cubic feet set. The generator-room is 45 feet square, and the stage-floor 16 ft. 3 in. above the ground-floor. Adjoining the generator-room is the engine-room, which is 45 feet by 22 feet, and contains the machinery required both for the present and the future generator sets. The equipment of the room is all in duplicate. There are two high-speed Tangye's engines, each of 35 B.H.P., speeded to 300 revolutions per minute. Each engine drives a Sturtevant fan at 2000 revolutions per minute, and produces an air pressure equal to about an 18-inch water column; one fan being capable of supplying air for all three sets. The two exhausters have each a capacity of 50,000 cubic feet per hour. There are two Lancashire steam-boilers made by the Oldham Boiler Works Company, 24 ft. by 7 ft., and 100 lbs. pressure, fitted with Wilton's breeze furnaces. The oil-storage tank holds 66,000 gallons.

The plant consists of two separate and distinct sets—viz., generators, carburettors, superheaters, scrubbers, washers, condensers, relief holder, engines, boilers, exhausters, purifiers, station-meter, oil-tank, pumps, hydraulic lift, dust interceptors, interlocking gear, oil-meters, sprays, &c.—the whole forming a well-arranged carburetted water-gas plant, erected by Messrs. S. Cutler and Sons. This gas is mixed at the inlet of the coal-gas holders. A disused gasholder tank is employed for storing the tar, &c.

In conclusion, Mr. Duxbury remarks that he has refrained from including costs of working and other details which were given in his Presidential Address last February.

WATER GAS AND STEEL PIPE WELDING.

By invitation of Messrs. Clayton, Son, and Co., Limited, and the "K. and A." Water-Gas Company, Limited, a number of gas engineers, chiefly from the Yorkshire and Lancashire districts, paid a visit to the works of the first-named Company, in Pepper Road, Hunslet, Leeds, last Wednesday and Thursday, for the purpose of inspecting a Kramers and Aarts water-gas plant which has recently been installed. As may be known, Messrs. Clayton, Son, and Co. have a large contract with the Leeds Corporation Water Department for the supply of some 23 miles of 33-inch welded steel water-mains, to be used in connection with the Leeds new reservoir. On the acceptance of this contract, ways and means had at once to be thought out for its speedy and efficient—not to say economical—execution, with the result that Mr. Clayton devised and laid down special plant for the whole of the work; and in doing so he has achieved, as was felt by his visitors last week, considerable success. For the purpose of getting a cheap and really adequate supply of gas to be used in the welding process, a "K. and A." water-gas plant was also installed; and this was probably the chief attraction to the gas engineers present.

The whole of the apparatus and the method of working it were clearly described, with the help of a diagram, by Mr. H. E. Smith, the "K. & A." Company's Engineer. A description of the apparatus and the process will be found in a paper by Dr. A. Steger, of Amsterdam, published in the "JOURNAL" for Sept. 18, 1906; and the accompanying is reproduced therefrom. It will be noted that one of the principal claims made for the system is economy in fuel consumption; and the firm are prepared to guarantee a production of 100,000 cubic feet of water gas per ton of carbon used—this being 40 per cent. greater than the results of any other plant. Carbon is stated rather than coke, as the quality of the latter obviously varies with the coal from which it is produced.

Starting with the facts that a shallow fuel bed is advantageous for water-gas plants during the "blow" (the necessary high temperature being obtained in shorter time and with less fuel) and a deep one during the "run" (the steam being in longer contact with the incandescent carbon), the "K. and A." system has been designed for the purpose of securing both of these advantages. The plant has two generators worked during the "blow" side by side, or, to use an electrical expression, in parallel; thus providing comparatively thin layers of fuel. For this operation 45 seconds are required. The incompletely burnt gases from the two generators are conducted to the regenerator by means of pipes lined with fire-clay, which enter one on each side of the mid division-wall. Here they meet the secondary air supplies, and complete combustion is effected before the stack-valve is reached. During the "run," steam is admitted to one generator only at a time, and the resultant gas travels from this into and up one side of the regenerator, over the division-wall, down the other side, and then into and down through the second generator. The steam is alternately admitted into each generator, so that the heat is regularly balanced, and the hottest part of the travel of the gas is always last. In the "run," which may be as long as 5¼ minutes, the fuel bed, therefore, is virtually deepened by placing one generator after the other. It will be appreciated that, so far as carbon dioxide is concerned, the second generator acts as a reducing chamber, and the carbon dioxide in the finished gas does not amount to more than 2 to 3 per cent. It was indeed stated during the visit that, under normal working conditions, the percentage was practically *nil*.

In reply to various inquiries, the amount of carbon required per 1000 cubic feet of gas was given as about 22 lbs., while the steam at the inlet of the generator ran at approximately 33 lbs. Reference was made to Mr. Leicester Greville's tests of a 50,000 cubic feet plant at Zevenbergen (alluded to in the article already referred to), where the generator coke amounted to 23·5 lbs. and the water to 3 gallons per 1000 cubic feet. The boiler fuel worked out at 2·8 lbs. per gallon of water evaporated, and was not included in the 23·5 lbs. given. The composition of the gas was as follows:—

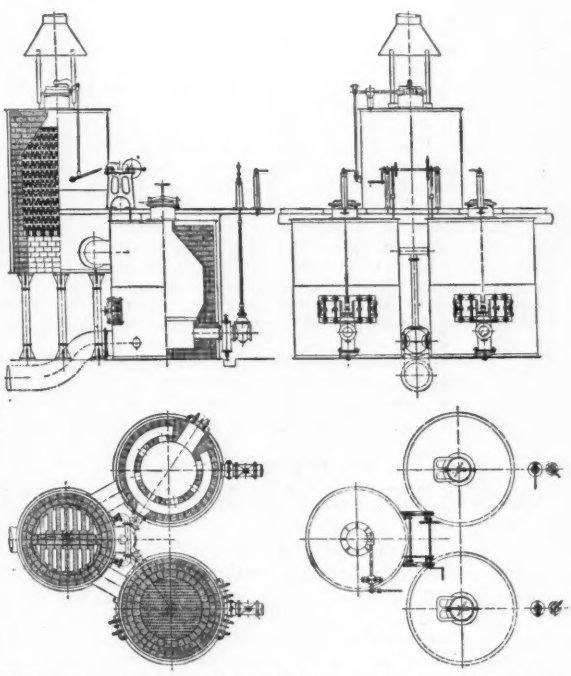
	Per Cent.
Carbon dioxide	2·85
Oxygen	0·20
Carbon monoxide	43·00
Hydrogen	47·90
Nitrogen	6·00

The calorific power as given by Mr. Smith was 315 B.Th.U. net. During the visit, an inverted incandescent burner using the water gas under the plant pressure (probably 18 to 20 inches) was lighted and shown.

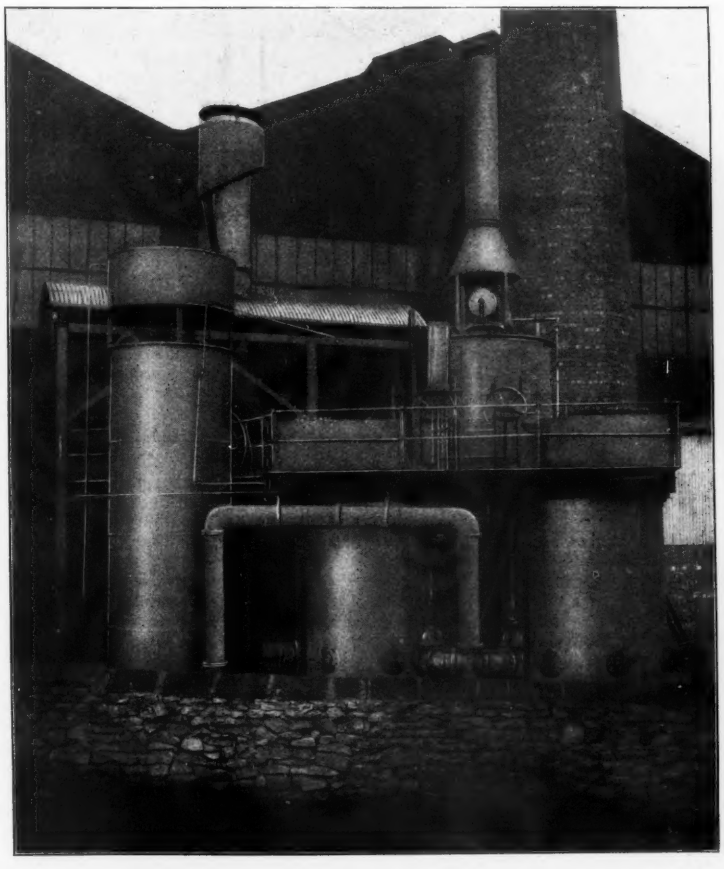
Though the particular plant under inspection was installed for industrial purposes, attention was specially drawn to its possibilities on gas-works for the purpose of auto-carburation, increasing the make, and relieving the local coke market. For pure "blue" water gas delivered into the holder, the cost, covering fuel, standing-off charges, depreciation, labour, interest, &c., is given by the makers at not more than 3½d. per 1000 cubic feet. Where benzol enrichment is undertaken, the firm suggest that a 15-candle gas would not cost more than 9d. per 1000 cubic feet. In passing, it was mentioned that a series of tests of Messrs. Clayton, Son, and Co.'s "K. and A." plant were shortly to be made by Professor W. A. Bone; and the results of these will be awaited with considerable interest.

The remainder of the plant consists of the usual boiler, blowers, engine, scrubber, relief holder (in this case of 27,000 cubic feet capacity), and auxiliaries.

Mr. Clayton then conducted the party through the workshops to inspect the process of welding; and incidentally the making



The New Arrangement of "K. and A." Water-Gas Plant at Amsterdam.



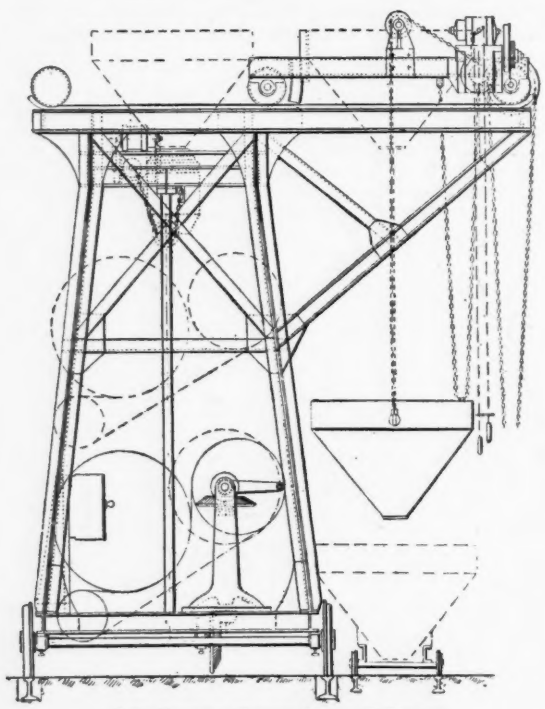
The "K. and A." Water-Gas Plant for Steel-Pipe Welding at Leeds.

of steel pipes. The pipes now being constructed are 18 feet long and 33 inches in diameter, and each is made out of a single sheet of ⅜-inch steel plate. With the plate rolled up to form the pipe, the seams are raised to welding heat by means of gaseous fuel burners; the water gas being served under a pressure of about 2 lbs. The proportion of air to gas was stated to be about 2 : 1. The welding was done over something like one foot run at a time; and it certainly appeared to be very effectively accomplished. The various processes of pressing-out and shaping the socket at one end, thickening-up and thus strengthening the spigot at the other, trimming-up, &c., and subsequently testing under hydraulic pressure of 400 lbs. to 500 lbs., were closely followed by the visitors, to whom Mr. Clayton proved an enthusiastic guide. The pipes when completed weigh 30 cwt. each; and the firm are making about seventy a week, although the plant is not being worked to its maximum capacity. They anticipate ultimately being able to deal with any pipes from 16 inches diameter upwards.

Mr. Clayton was cordially thanked for the opportunity afforded of both seeing the water-gas plant and his own development of the steel-pipe industry. A similar expression of appreciation was also made to Mr. Smith, the "K. and A." Company's Engineer.

DE BROUWER CHARGER FOR SMALL WORKS.

With the view of facilitating the introduction of mechanical stoking into small gas-works, the Compagnie Anonyme Continentale pour la Fabrication des Compteurs à Gaz et Autres Appareils, of Paris, have devised an arrangement of the De Brouwer charger which they consider suitable for these establishments. It is shown in the accompanying diagram, which is reproduced from a recent number of the "Journal des Usines à Gaz." The charger is mounted upon a stage running upon rails. It is moved by hand, by means of a winch and suitable gearing.



A De Brouwer Charger for Small Works.

The machine consists of a wooden frame supporting the charger, with the electric windlass by which it is raised or lowered to the level of the different retorts; and it is provided at its upper part with a bracket and carriage capable of bearing the coal-hopper. This is loaded in the coal-store, drawn by Decauville waggons into the position shown in the illustration, and raised first to the top of the machine and then moved along till it stands over the charger. In order to avoid interruption in working, it is desirable to have three or four hoppers with each machine. The ordinary elevator and conveyor are replaced by lifting tackle upon the charger itself. Another arrangement patented by the Company allows of the charger being turned, without the aid of turntables, in a very small space; so that it can be employed to serve two benches of retorts set face to face in one house—an operation which the patentees believe has not hitherto been accomplished in small works.

Mme. Curie, the widow of the eminent scientist, with whom she collaborated in the discovery of radium, has been promoted to the Professorship of General Physics at the Sorbonne.

AN ACCIDENT AT THE BANKSIDE GAS-WORKS.

YESTERDAY week a report gained currency as to an accident that had happened at the Bankside works of the South Metropolitan Gas Company; but at the time the "JOURNAL" for the 24th ult. went to press, there was no possibility of getting any authentic details of what had occurred. Since then, however, Mr. Charles Carpenter, the Chief Engineer of the Company, has sent the following particulars.

While a gang of men were emptying an oxide purifier at the Bankside works on Monday, Nov. 23, an ignition occurred of the gas remaining in the purifier, with the result that five men were burnt—three of them somewhat severely. The cause of the ignition is not clear. It may have resulted from a spark produced by a blow given by a shovel or graft, or a patch of the spent material may have ignited spontaneously on exposure to the air.

The purifiers in question have dry lutes, instead of the usua water-seal; and, in all probability, the accident is attributable to this fact. The practice in lifting the cover of the purifiers provided with water-lutes is to do so with the air-valve on the cover closed, but with those on the bottom of the box opened. The cover in this case acts as a piston, drawing upwards all the gas contained in and between the layers of material; its place being taken by air entering at the bottom. When the lifting operation is completed, the cover valves are opened, and the gas is allowed to escape into the atmosphere.

With dry-lute purifiers, this operation is not possible; and hitherto the Company have relied on taking two manholes off the bottom of the box, so as to allow the air to enter, and thus displace the out-flowing gas. It is possible, however, that if the material lies heavily and is caked upon the sieves, this may take a very considerable time; and it has now been arranged to couple-up a blower to the bottom of each box, so that the residual gas may be swept out effectually by a current of air before the operation of discharging is commenced.

Three of the five men burnt were detained in the hospital, but are going on well.

Gaseous Fuel Research at Leeds University.

Owing to the resignation of Dr. Drugman, it has been necessary to appoint a successor to take charge of the research into the use of coal gas as fuel. After interviewing four candidates, the Sub-Committee in charge of the matter have, we learn, engaged Mr. E. W. Smith, M.Sc., who graduated B.Sc. in the Honours School of Chemistry at Manchester University in 1906, and took his M.Sc. degree in 1907. He has had a considerable amount of experience in pyrometry as well as gas analysis.

Winter Meeting of the Association of Water Engineers.

We learn from the Secretary (Mr. Percy Griffith) that the arrangements for the thirteenth winter meeting, which will be held in the rooms of the Geological Society, Burlington House, W., on Friday and Saturday, the 11th and 12th inst., under the presidency of Mr. H. E. Stilgoe, M.Inst.C.E., are now complete. The proceedings will commence at two o'clock on the first day, when, as previously announced, Dr. Hugh Robert Mill will deliver a lecture, illustrated by lantern slides, on "The Measurement of Rainfall." This will be followed by the reading and discussion of papers, of which three have been promised—viz., "The Water Supply of Hythe, Kent," by Mr. Christopher Jones; "Description and Notes on the Teignmouth Moorland Water Scheme," by Mr. C. F. Gettings; and "A Short Account of a Water-Borne Outbreak of Typhoid Fever," by Professor W. R. Smith, M.D., F.R.S.E. If time permit, the Secretary will open a discussion on the subject of the registration of plumbers as affecting water authorities. On the morning of the second day, ballots will be taken for the election of the Council and officers for the year 1909-10, and also of any new members proposed, after which the remaining technical business will be disposed of, and the meeting will close at half-past one. Arrangements are being made for the members to spend the evening of the first day in social intercourse.

Electrolysis of Water-Mains.—It appears that the electrolysis of water-mains in Boston and the vicinity is going on at a greater rate than ever before. The investigations made in 1907 by the Metropolitan Water and Sewerage Board show that the pitting and disintegration of the pipes by electric action have become very serious; and the destructive process is continuing, even in places where insulating joints and other devices have been applied as a remedy.

Calcium Cyanamide in Agriculture.—In a communication made to the Paris Academy of Sciences by MM. Müntz and Nottin, the authors stated that, it having been shown in previous papers that the rapidity with which nitrogenous manures are converted into nitrates is a measure of their usefulness as manures, they had studied calcium cyanamide from this point of view; and it had proved to be as active as sulphate of ammonia. This result was confirmed by culture experiments.

LONDON AND SOUTHERN DISTRICT JUNIOR GAS ASSOCIATION.

The Second General Meeting of the Association for the present session took place last Friday, at the Cripplegate Institute, Golden Lane, E.C.—Mr. W. J. LIBERTY, the President, in the chair. It had been announced as a "short paper" evening, and two communications were submitted—one by the President, and the other by Mr. J. Hewett. There were about fifty members present at the meeting.

The PRESIDENT, at the opening of the proceedings, remarked that he had received a letter from the Chairman and Directors of the South Metropolitan Gas Company, acknowledging the sympathy of the Association with the Company in the loss of their late Chairman; and he had had a communication in the following terms from "Shagbrook:" "To the President and members of the Association, Lady Livesey desires to express her deep gratitude for the kind sympathy shown her in her sorrow." With regard to the visit to the Old Kent Road Works which had been arranged for Saturday, Dec. 5, Mr. Charles Carpenter, the Chief Engineer, had written saying he would be very pleased to come down and welcome the members.

FALLOW GROUND.

The PRESIDENT read the first paper, which bore the above title; and in the course of it he said that during the past year the Association had visited a number of Companies on the outer ring of the Metropolitan area, and thus had seen somewhat of the advance in the methods of carbonization and work generally. He thought, however, that what had struck them most was the very rapid growth in output. The enormous increase which had taken place would be seen from the following figures of a group of eight Companies in and around London—including the three Metropolitan Companies. They related to the three June half years from 1905 to 1907.

Half Year to June.	Gas Sold. Thousands.	Revenue from all Sources.
1905	21,383,819 ..	£3,658,213
1906	22,286,439 ..	3,787,119
1907	23,136,458 ..	4,070,460

They would agree that these figures did not represent a dying industry or a decaying trade. It seemed as if the officials of the great Suburban Companies could sit down and watch their concerns grow. Taking the Ilford Company alone, they had trebled their output in nine years, and doubled it in five years. Steadily as time went on the consumption of gas for all purposes increased. There were incandescent mantles, slot meters, cookers, engines, tools, laundry and tinsmiths' appliances, high-pressure lighting, various labour-saving devices, and lastly gas-fires (which were relatively not at present a very great factor), doing much to place the industry on a broader and more solid base. Though many of these fresh avenues might be helping, the increased consumption was not so much the result of tapping new sources as the natural growth of ordinary business, more especially as far as the Suburban Companies were concerned. In the last report of the Commissioners of Inland Revenue, it was stated that the gross income assessed in respect to gas-works for 1905-6 was £7,413,611, which was an increase in a decade of nearly £2,000,000, or about 34 per cent. The capital of the industry was about £125,000,000. This, it must be admitted, was rather a robust condition of affairs.

As to the "fallow ground," taking the centre of London, he found that the three important Gas Companies had no less than 600,000 gas-stoves out on hire, apart from those privately owned, of which there were a considerable number; and that they supplied no less than 900,000 consumers with gas-engines, fires, tools, and other apparatus for using gas, while the 31 Electric Light Companies or Corporations in the much larger Metropolitan area had but 80,000 consumers between them. These figures showed the enormous potentiality of the Metropolis in regard to lighting, heating, and power, and might explain the appearance of the London Electricity Bill. In his opinion, the ground was not yet covered. There was still a large field lying fallow, and in some directions almost untouched; and if the increases to which he had alluded were to be, not only maintained, but added to, it behoved everyone connected with the industry to do regarding it something similar to that which was done in respect to the incandescent mantle, the prepayment meter, and the cooker. The untouched field to which he referred was heating and power. Gas-stoves constituted a territory largely unexplored. Coal still held the favour of householders; but as they had it upon the authority of Professor V. B. Lewes that for heating purposes gas at 2s. per 1000 cubic feet was equal to coal at 18s. per ton, and best household coal was now quoted at 25s. 6d., there was ample margin to work on—especially as it could be pointed out that this saving was still further increased by the advantages of immediate lighting and extinguishing, no stand-by being required, and less labour, which helped to solve the domestic servant question. It was estimated that there were 54,575,000 tons of coal used annually in the United Kingdom for domestic purposes, or an average of about 1¼ tons per head of the population. Against this, there were no less than 270 statutory gas companies; but had they all entered into the spirit of the conquest? Manufacturers had done wonders in placing upon the market many types of efficient fires. It was the gas makers who had to do the rest; and if it was not done when the price of ordinary fuel was abnormally high, could it be so well done when fuel prices fell? Now was the opportunity. It had already been demonstrated that a gas-stove—not an extravagant gas-fire in an open grate, which let the heat escape up the flue, but those shallow stoves with a single tier of fuel and plenty of fire-brick, properly fixed, and with a flue attached, had no detrimental effect upon the health of the occupants of a room; and doctors (the most conservative of professional men) were recommending them for bedrooms. With the doctors convinced, all else should be plain sailing.

The author next referred to the remarks of Mr. James Swinburne in his Inaugural Address to the Association of Engineers-in-Charge some weeks ago (as noticed in the "JOURNAL" for Oct. 20, p. 193); pointing out that that gentleman had suggested gas as one of the remedies for the smoke nuisance, though criticizing the ordinary form of gas-stove. He then alluded to the remarks made at the recent meeting of the Southern Association by Mr. F. W. Goodenough, who spoke of the district inspectors of gas companies as commercial travellers, whose province it was, because of their excellent and unique opportunities, to bring in new customers, and new business among old customers. The President, while agreeing with this, asked whether it was of great use for the rank and file to put their backs into this business unless they could at the same time appeal to the pocket of the consumer, by way of a rebate in some form or another, on gas used for stoves, similar to that now in vogue in regard to engines. He pointed to the fact that electrical companies could obtain heating business by sending out radiators with current at about half the charge for lighting. What appealed to a customer most in this case was the fact that he could purchase his current for heating at a reduced rate.

With regard to cookers and mantles, the President remarked that these new sources of revenue came to the rescue of the industry, and helped to save the situation; but this was fast becoming ancient history. Suitable stoves were now on the market, they had a fairly cheap gas, lower in illuminating power and higher in calorific value, and distributed at a much higher pressure than formerly. These were all facts in favour of fires; and if a cheap rotary meter could be attached to them, by means of which a good discount could be allowed, and consumers would be enabled to see the amount they were burning, this would aid in the placing of many fires. He gathered that 30 per cent. only of the gas consumers of the United Kingdom had cookers; while north and south of the Thames, where these appliances were much in favour, the percentages were but 60 and 78 respectively. There was room for the turning up of some "fallow ground" here; and if the percentage was so small with cookers, the difference was more marked with fires. With regard to one Metropolitan Gas Company, it was stated that out of 107,000 ordinary customers only 22,000 had gas-fires. They might think what it would mean if the number of fires in this case equalled the number of consumers—and this might well be, considering that some consumers had quite a large number.

The author next turned his attention to the application of gas to industrial uses—instancing, in addition to engines, tin-smithing, laundry work, and lead type melting with gas at high pressure, as well as the purposes for which Mr. E. C. Riley is using gas at the Great Western Railway Gas-Works at Swindon, as recorded in his paper read at the last meeting of the Southern Association (see "JOURNAL" for Nov. 10, p. 416)—*i.e.*, for expanding steel locomotive tyres 3 inches thick for putting on and removing from wheels, heating tool steel for hardening and tempering, &c. He argued that if a railway gas-works found it paid to do all this, it should be considered whether those who made gas commercially might not take up these and other industrial points.

After referring to the new "Eclipse" boiler-furnace as a smoke preventer (noticed last week, p. 575), the use of a huge gas-engine plant at the Associated Cement Manufacturers' works at Swanscombe, and the employment of high-pressure gas in glass works, the President alluded to the new inverted high-pressure lighting now being arranged for Fleet Street. He remarked that the Gas-light and Coke Company, when putting the 6-inch high-pressure main down this thoroughfare and the Strand, were (no doubt seeing the possibilities for type melting, &c.) fitting tees on the main at the junctions with the cross streets. This kind of business, however, he said, wanted fetching. The West Ham Electricity Department had been figuratively "heaving" flat irons at their customers; and only 40 per cent. had "heaved" them back again—the other 60 per cent. keeping and paying for them. To sell 60 per cent. of distributed articles was not bad business; and gas companies had good gas-heated laundry irons.

His object in writing the paper was to impress upon the members the necessity of going into the "highways and byways" of the industrial community of the Metropolis, and reaping the harvest that would follow the turning up of this ground. Monopoly had had its day. Competition was once more rife, and with it came the development of commercial methods. It was for the gas industry to seize the opportunity and enter into, and break up, this "fallow ground."

Discussion.

Mr. W. UPTON said it seemed to him that really the essential part of the paper was the question of the "fallow ground." That ground was practically only in the direction of gas-fires. This

the majority of them were now quite well aware of; but one point he wished the author had entered into more fully was that of differential prices. It was most obvious, to those who thought. that the price charged for lighting gas was not going to succeed. Mr. Liberty had mentioned the use of the rotary meter, which, on account of its cheapness, could be attached to gas-fires, and thereby enable a differential rate to be charged; but what was involved in this was the differential price. What was it to be? He would have liked some indication from the author as to what should form the basis of the reduction—how such rebate should be arrived at. The charges for gas were composed of several factors, which roughly could be divided into standing charges and running charges; and until these were thoroughly gone into, he did not see how it would be possible to arrive at any idea of what the price should be. It was a very big subject. A company he knew of, working in another part of the world, had succeeded in doing a large amount of business with gas fires and cookers; and for both purposes a substantial reduction was made from the lighting rate. He believed that, from a commercial point of view, a reduction should be made if those appliances were to be used which really opened up the "fallow ground" to which reference had been made. The allusion to the use of gas under high pressure for railway purposes was very interesting, but it scarcely touched the question of "fallow ground" from a gas-works standpoint. It was a special application; and possibly it did not matter much what the cost was, as there were technical reasons for the use of gas. Of course, at Woolwich Arsenal gas was employed for many purposes; but there, again, cost might be a secondary consideration. The main point for them was that stoves constituted the chief part of the "fallow ground;" and the question was, How was this branch to be tackled?

Mr. L. F. Tooth remarked that, with reference to gas-fires, he felt that he must endorse all the author had said with regard to a discount by means of an additional meter. Of course, separate supplies could be run to gas-fires, and another meter be put in in the ordinary way. Giving consumers a discount would mean that they would avail themselves of the opportunity to put gas-fires in all over a house, which at present prices was impossible. As to employing gas for tyre shrinking and other trade purposes, his own opinion was that there was a big future for town gas in this direction—even bigger than for gas fires or cookers. The prospects of gas for trade supplies were really marvellous. He knew of one case where a shipbuilding firm were actually bending ½-inch, ¾-inch, and 1-inch steel plates by the aid of coal gas, and doing it successfully, and much cheaper than with an ordinary forced-draught furnace. Another thing for which he considered gas would be largely used was the welding of motor tyres, which was absolutely an industry of itself. Coal gas had not been hitherto successfully employed in this way; but this was possibly because the necessary attention had not been given to the matter, and they were not working at sufficiently high pressures. For trade purposes he would allow an even bigger discount than for gas-fires or cookers.

Mr. P. J. Smithers said he was of opinion that until they allowed a substantial reduction in the price of gas used for heating and cooking, they were not going to make the headway they should. As to why people did not take to gas-fires more than was the case, he had for some years been round examining fires, and the state in which he frequently found them was such that they did not recommend themselves to anyone. Gas-fires should have attention, as they would get out of order; and until they got men who thoroughly understood how to put them right, they would continue to have a lot of trouble.

Mr. P. E. Culling suggested that from a consumer's point of view it would be most acceptable if the gas companies could arrive at some arrangement whereby there would be a kind of sliding-scale of charges according to consumption. This would to a certain extent encourage people to use gas-fires more than they now did. As to hiring-out fires, he believed the Ilford Company and at least one other he knew of had given up the plan, as they found the hire-purchase system paid much better, on account of the improvements taking place in gas-fires every season. Each consumer liked to be up to date; and if on simple hiring terms, when a new fire came out, he wanted to have the latest pattern, and to send back the one he had. Consequently the gas company might have a number of fires returned in a few weeks. The question was, What were they going to do with them?

Mr. A. Broadbent, alluding to the previous speaker's remark about the sending in of old-pattern stoves, said he thought this was the best thing that could happen. The consumer would get more satisfaction, and consequently would be more likely to recommend such appliances to his friends, if he himself had the most improved kind of fire. He did not think the hire-purchase system would solve this difficulty, because in such cases if stoves were unsatisfactory the consumers would condemn them—they would not go to the expense of buying others.

Mr. W. Wright remarked that the Tottenham Company, in order to prevent fires being sent in during the summer months, charged only for hire over the winter quarters. As to trade and domestic appliances for gas, there was a large business being done in coppers for washing purposes, which were let out at hiring rates. He knew of a firm in London who were now bending 6-inch tubes by means of ordinary coal gas, and found it very cheap.

The Hon. Secretary (Mr. J. G. Clark) said he had no doubt most of them had at times been struck by the, as yet, unexplored fields for the application of gas. In spite of the present many useful services of gas, they were by no means exhausted. With regard to advertising apparatus, one must admire the ingenuity of the electricians. Though there was already some extremely simple mechanism of this kind for use with gas, he believed that there was room for still more striking results. As to lighting, there were some fine gas-lamps now. They had seen them at the Franco-British Exhibition giving over 60 candles per foot. When, however, they reflected that even with this high efficiency they were using probably less than 10 per cent. of the energy of the gas, it seemed that they were still at the bottom of the efficiency scale, and so should look forward to much higher efficiencies yet. It was very gratifying to think that these lamps were being produced on this side of the Channel. Though they had such good prospects in regard to their own possible efficiencies, the electricians had equally good prospects. At a meeting of the Optical Society at which he was present some two years ago, Dr. C. V. Drysdale, speaking of the new filament lamps, gave it as his opinion that the ultimate efficiency would be found to be about 1-10th watt per candle. He was an expert electrical engineer, and no doubt had well-founded premises for his statement. This would, of course, be about ten times as efficient as the very best recorded results of the osram lamp. With regard to power, they had now in the gas-engine a very simple means of producing power; but he believed that, just as the steam-turbine had many advantages over the reciprocating engine, so when they had a good reliable gas-turbine, they would find still further applications for gas. The gas-turbine was a machine with an absence of reciprocating parts; and if it was ever made successfully, it would probably be in very small units. The question was perhaps one for the gas-engine expert; and no doubt the gas-turbine was an exceedingly difficult problem. If, however, they did get such a turbine, it would place within their reach a new field for the application of gas for power.

Mr. O. W. Dougan thought that many people would like to use gas appliances who did not see their way to purchase them. With these small persons capital was a great thing, and they did not care to lay out money; but if they could hire gas apparatus, they would be only too pleased to do so. In most districts, for instance, there were any number of small laundries; and if machines were hired to them, he felt sure that a great deal more business would be done. In the big laundries, of course, gas was to be seen.

Mr. K. Sproxton said the district with which he was acquainted had no factories; and gas-fires constituted the only "fallow ground" they could claim. It seemed to him that the difficulty was not the price of gas, but the trouble of having the fires put in. It meant having the workmen; and most people would do anything rather than face this. He found that where gas-fires were provided for by the builder of a house, they would be used; and many North London builders were now arranging to have, not only the portable coppers that had been mentioned, but also gas-stoves already fixed in the room which was partly kitchen and partly parlour. Several of the builders in his district arranged for gas-fires in many of the principal rooms in a house; and it was found that they were used. The idea of a differential charge was a complicated one, which must not be rushed into without considerable thought. He would like to ask whether, in the event of a rebate being allowed to gas-fire users, it would have any effect on the dividend sliding-scale. After all, the business of gas companies was not to get a tremendous output of gas, but to secure a satisfactory output at a substantial profit. It was, of course, wholly essential that they should have a good output; but it must be at a figure which would pay the company. If they took to giving their fire users a large rebate, the other consumers would have some rather unholy feelings about the charges that were being made to them for light. They would want to know what the company had been doing with the extra profit, if they could sell gas so much cheaper for fires. He would certainly prefer giving the consumers the benefit of an all-round reduction, rather than go to the expense of a rebate meter and institute differential charges for gas.

Mr. F. Ainsworth agreed that there should be a reasonable rebate allowed for cooking and heating of every description, and said the next question was how to arrange for this. If a number of fires were put in a house, and gas was used for heating water, &c., it would, of course, pay to have a separate meter fitted; or a minimum consumption could be fixed, and beyond that amount a fair rebate be allowed. There was a splendid opening for heating and cooking. No doubt the electric people did allow rebates to an unreasonable extent. In Ilford, one could have an electric radiator, and they charged 2d. per unit, which was reduced to 1d. after it had been used for a certain time—a price at which they could not really afford to supply current. In at least one case the Electricity Department were taking the current to a works a mile or more from the generating station, and supplying it at 1d. per unit; but, of course, it was used day and night. Yet they themselves were running the trams, and using more current than all the other consumers put together, and charged for this 1½d., though they commenced to use the current right at the works. Returning to gas fires and cookers, these were things he had always taken great interest in. He never allowed one to be put out of use (if he knew about it) without going to ascertain the reason. They were the two best things gas companies had; and they needed nursing. His Company were now fixing more fires than ever, and they did not get one complaint where they used to have

twelve. Why? Because gas-fires were now being brought up to date and properly fixed. They could get a ball-fuel fire at the present time that would heat a fair-sized room—and heat it well—with a consumption of 20 cubic feet an hour. He believed that if they pushed the fires they now had, they could get them into houses in abundance; and he was looking forward to the time when—where gas was under 3s. per 1000 cubic feet—they would be used in every room, except perhaps the living-room, both for cheapness and convenience. The subject was a very important one. The engineers were learning how to make gas cheaply; and what they wanted was that those on the district should learn how to sell it.

The PRESIDENT, in reply, asked Mr. Upton whether he could not answer his own question, by giving them some idea of what the differential charge was in the case of the company to which he referred. He wondered whether Mr. Tooth meant, when he mentioned the use of ordinary gas for the bending of tubes, gas at ordinary pressure.

Mr. TOOTH: Yes.

The PRESIDENT (continuing) said a member asked about the sliding-scale. He did not think the question of a rebate would have any effect upon this, because the companies would certainly take care of their proprietors. He hoped the point that had been made that small people would like to hire tools for trade purposes would not be lost sight of. Mr. Ainsworth had told them the secret of the Ilford Company's increased consumption—the large number of fires that were being fixed, and kept in use. When the saturation point was being reached in other directions, fires with a discount meter would be their salvation. Perhaps the question would be solved by a rebate of 10 or 15 per cent.

RULE-OF-THUMB AS APPLIED TO GAS-WORKS CHEMISTRY.

Mr. J. HEWETT read the second paper, which was on the above subject; and in the course of it he said that in many works the duties of the chemist were numerous; and in the carrying out of multifarious experiments, tests, &c., he was probably obliged to rely for a great portion of the work upon the performances of assistants, who, owing to the existing circumstances, were not possessed of any, or, at least, very little, actual chemical training. For the convenience of these assistants, a good deal was done in the preparation of methods, and also of, to them, perhaps more or less mysterious figures, factors, &c., in order that the work might thereby be greatly facilitated. The responsible person had not always the time or opportunity to go into every detail of these particular tests with the performers thereof; and unless considerable trouble was expended in a modified training, a good deal of the efficiency of the work depended on the interest displayed and the natural desire for accuracy of those engaged in it.

It was no doubt, in a measure, difficult to impress upon the mind of a person without chemical experience the absolute necessity of attention to small things. Subjects which would appeal to almost anyone—such as (say) the checking of an experimental meter for registration and the proving of its soundness—were not quite so difficult to deal with, though there were many methods of proving an experimental wet meter gas-tight. Such things as putting the meter under pressure with gas, and trying with lighted tapers, soap and water, and so forth, at the several joints, or even the application of a pressure-gauge, were hardly sufficient when one desired to state that the meter in question was quite gas-tight. The aid of the lighted taper, though mentioned as having been seen in use, was not recommended, as it might mean, in the case of indiscreet application, the cost of a new meter, as well as serious inconvenience to the operator. The use of an ordinary gas washing bottle, or a bottle made up with an inlet and outlet tube through a rubber stopper, the inlet tube dipping below water in the bottle and the outlet tube being above the surface, furnished a much more reliable means of proving a meter gas-tight, and would instantly detect a leak of the smallest dimensions. Of course, this plan did not tell where the leak actually was; but most of the other methods would fail similarly, unless the leak was fairly large or was hit upon fortunately. It was the small leak which gave the greater trouble, and the knowledge of its presence was half the battle.

The question of a leaky meter, as already remarked, was a subject which would appeal to almost any person; but when small things came to be considered, the position was sometimes altered. The use of a dirty stirring-rod, or the hasty glance at the weights employed, the failure to obtain a solution of the same strength throughout from want of proper agitation in a vessel of sufficient dimensions, the use of dirty dusters, the habit of placing stoppers from bottles on the bench and thereby contaminating them with probably the very substance from which they should be kept specially free, and many other similar pitfalls into which the unwary operator might be led, were the sources of many a ridiculous result, and consequent racking of the brain of the responsible person for an explanation. In fact, the number of slight inaccuracies which might occur in quite an ordinary way was almost legion.

The indiscriminate use of rubber tubing for sources of supply was much to be deprecated. The author said he once had the opportunity of witnessing this practice in an advanced stage, and under the very conditions where it was most desirable it should be absent—viz., in an apparatus erected for the estimation of naphthalene in coal gas. The employment of 4 or 5 feet of rubber tube before the bottles of picric acid solution did not apparently appeal to the users of the apparatus; and it was small wonder that the results in this case were very low. The marvel was that any $C_{10}H_8$ was found at all, seeing that the absorptive power of rubber for $C_{10}H_8$ was far from negligible. Again, although rubber was useful and necessary for some things—such as water supply to condensers, &c.—its capacity for kinking rendered it unsuitable for long experimental gas supply connections, even if its use in long lengths was not detrimental to the results of the experiment, which was very questionable where coal gas was concerned.

The tendency to follow the book or instructions blindly, which had been apparent in more than one case known to the author, was also likely to cause trouble, if overdone. Take, he said, the Gas Referees' test for sulphur compounds, for instance. In the instructions, the operator was told to add an excess of barium chloride solution to the acidified liquor, but was not told how to ascertain that this had been done. Here was an example where the following out of the instructions was not quite clear to the uninitiated. In the event of a slight rise in the amount of sulphur compounds present, the operator who had habitually added a certain quantity of a particular solution of $BaCl_2$ might commit the error of not adding sufficient to meet the case, and thereby deceive himself and his superiors, to whom the information conveyed by the figures given would be worse than useless. That this had actually occurred had on more than one occasion been brought by the author to the notice of those concerned. The simple addition of a drop or two of $BaCl_2$ solution to the liquor, after allowing it to settle before filtering, or to the clear filtrate, would have averted all the trouble. But some would urge: "The book does not say so; and I did not think it was necessary." This was where the rule-of-thumb came in; and he was afraid a good many other instances could be quoted, if the memory was sufficiently taxed.

The taking of things for granted was also too often the cause of inconvenience. One case of this kind was noted by the author, in which, to a certain solution to which hydrochloric acid should have been added, sulphuric acid was added in its place. This mistake was made simply because the bottle containing the H_2SO_4 occupied, by some mischance, the position on the shelf which was generally allotted to the HCl. Though the bottle was properly labelled, this error was committed—probably because the person in question had become so accustomed to see the HCl bottle in one particular spot that he did not dream of any other bottle being there. A label on a bottle was quite useless, if this habit were allowed to grow upon the user. When the means for making sure that there was no mistake were so close at hand, and would probably mean only the space of a second or two, it was surely far better to grasp the opportunity and set at rest doubts which were certain to arise in the mind of the worker when a question was raised as to the accuracy of his figures.

It was against practices such as these, and numerous others which could not be included in the course of a paper based on brevity, that the person responsible for the ultimate success of the work had to compete. The necessity for constant criticism and watchfulness was therefore apparent; and as it was nearly always impossible to carry out the well-meant advice of some—viz., "If you want a thing done, you must do it yourself"—it was obvious that, to avoid ridiculous results and unlikely happenings, the work required the closest attention to details that could be given, and self-criticism should be one of the uppermost subjects in the mind of the worker, however little he might know of the actual principles of the work on which he was engaged. There was generally someone who could give advice, or a helping hand, on occasions when difficulties arose; and if the person in doubt would bring them forward, he might not only gain information for himself, but also open the eyes of those to whom these things were mentioned—thereby making the occasion of double interest and usefulness.

Discussion.

The HON. SECRETARY remarked that there was always more or less difficulty in conducting chemical investigations at the early part of the gas manufacturing plant, due to the complex character of the gas at these points. The gas was unpurified, or only partially so, and thus it was not difficult to see that an experiment might be easily disturbed. Unless they took account of everything, they were bound to get into trouble; it was necessary they should not take things for granted. Experiments before the washers were difficult, owing to the tar and moisture fogs in the gas—more especially if the condensing plant was of inadequate dimensions. A spray of tar and liquor might be experienced on opening the gas-cock which might well disturb an experiment. On one occasion, he was instructed to ascertain the quantity of cyanogen compounds in the gas before the washers—that was, just beyond the condensers; and he found a spray of moisture and tar at the cock. He placed a small coke scrubber between it and his apparatus, so as to keep the tar back. After running the test for a certain time, on examining his absorption solutions, he found no cyanides present at all. This was obviously absurd, because the gas at this point would contain practically the whole of its cyanogen. It was afterwards discovered that the material in the scrubber had intercepted almost the whole of the cyanogen. This was due no doubt partly to the coke and partly to the ammoniacal liquor in the scrubber. A special experiment made afterwards to ascertain the effect of contact between the gas and ammoniacal liquor upon the cyanogen, showed that such contact really tended to convert all the cyanides into

thiocyanates. In fact, any loss of the former was almost exactly accounted for by estimation of the latter. That showed the importance of detail in this kind of work. Had the absorption by the scrubber been only partial, instead of practically complete, a large amount of incorrect work would have been done before the error was found out. The author had used the registration of a meter as an example. Correction for pressures was usually ignored, if they did not exceed a few inches; but he had found cases where gas had been measured at 20 to 60 inches, regardless of the fact that the density of the gas was increased considerably by the compression. This was another case of inattention to detail. He had lately been engaged in making a number of experiments on gas-fires and other similar appliances; and he was beginning to find that many of the points which he thought at first were unimportant were in reality extremely important. Evidently, if any accurate results were to be obtained, attention must be given to detail in this class of work. They must not jump at conclusions or take things for granted, or they would be certain to get into trouble.

Mr. SPROXTON asked the author whether he would explain why there should be the method of using barium chloride solution in such small quantities. Why should not a large excess be employed? He understood it was a fairly cheap substance, and so there would be little objection on this score.

Mr. HEWETT, in reply, remarked that the Secretary had his sympathy in the experiences he had related; but everyone who had anything to do with chemistry seemed always more or less to be stumbling over these little things, which tended to upset one. He was afraid that putting in a coke scrubber to get rid of the tar vapour was just the thing that should not have been done. At the inlet of the washers, in some works, such vapour was present in fairly large quantities; but in his own works they were very lucky in this respect, as there was practically none at the outlet of their condensers, because these were extremely efficient. The interference of straining mediums, such as cotton wool, &c., was in some cases sufficient to destroy the whole object of an experiment; and if it was in any way possible to do without these appliances, it was much better. He had seen a tower of sawdust used before a test for naphthalene, the result being no naphthalene in the gas at the outlet of the tower—the resins in the sawdust having prevented the naphthalene from coming forward. In reference to the Gas Referees' notification, looking at the detail into which they went on every subject, one would imagine that they could not possibly have forgotten to put in the one little item to which he had referred in his paper. A person was told to add an excess of barium chloride solution; but he was not told how to show that he had added this excess. The people who carried out these tests were not all skilled chemists; and if they were not extremely careful, they might add what they thought was an excess, and get a result that was too low. Mr. Sproxton asked why they should not always add sufficient to ensure a large excess; but it must be remembered that all the excess added had to be washed out before they dealt with the residue. This took time; and if they added a large excess, it might take all the afternoon to wash it out, before they could finish their test. Even the use of a theoretical large excess was not so decisive as actual proof that excess was present; and as it was so easily carried out, there should be no chance of doubts creeping in.

The proceedings concluded with hearty votes of thanks to the authors of the papers, on the proposition of Mr. AINSWORTH, seconded by Mr. TOOTH.

REGISTER OF PATENTS.

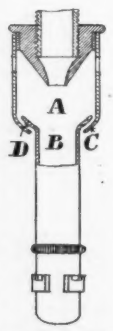
Inverted Incandescent Burner Anti-Vibrator.

PULLEN, H., of Bradford.

No. 27,679; Dec. 16, 1907.

The object of this invention is "to produce a burner which shall effectively protect the mantle from shocks or vibration, without the addition of springs, flexible tubes, balljoints, or other devices not forming an integral part of the burner."

The central or bunsen tube of the burner is divided into two sections. The upper and shorter section, A, consists of the portion of the tube in which the holes for the ingress of air are situated; the lower and longer section, B, consists of the portion of the tube to which the mantle, heat-deflector, and shade or globe-carrier are attached. The upper section of the tube is made considerably wider than the lower section; but the bottom end, C, is rounded or tapered until the outlet is of somewhat greater diameter than the lower section of the tube. This lower section has a projection or flange, D, round the upper end, the under surface of which is rounded or tapered to fit inside the corresponding bottom end of the upper section. The lower section of the tube is then lowered through the upper section until the parts come in contact, when the lower section of the tube remains suspended. The mantle and globe or shade carrier and deflecting-cone are afterwards attached to the lower section to complete the burner, which "possesses considerable freedom of movement, the upper portion only being fixed solid to the pendant or bracket."



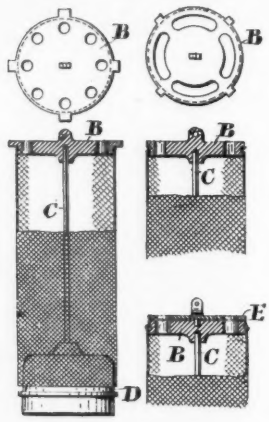
Pullen's Anti-Vibrating Inverted Burner.

Upright (Vertical) Incandescent Gas-Mantles.

MITCHELL, F. H., CORRIE-JONES, W., and MILLWARD, A., all of Manchester.

No. 26,373; Nov. 29, 1907.

This invention has for its objects to permanently secure a substantially cylindrical texture at its upper end to the grooved periphery of a disc of approximately the same diameter, made of refractory material, and provided with apertures for the escape of the products of combustion—see the accompanying sectional elevation and plan of the mantle and carrier disc: (1) with concentrically arranged equidistant circular perforations, the disc being adapted to be supported by a central stem; (2) with concentric curved slots; and (3) with the openings in the disc controlled by a second disc.



Mitchell's Incandescent Burner Mantle.

The complete mantle is fitted with a carrier disc B (preferably steatite, magnesium clay, asbestos, or the like) sustained on a straight rod C projecting from the burner D or suspended from an external hook. The disc is provided with apertures near its circumference—circular perforations, concentric slots, or the like. The disc, it is claimed, retards the escape of the products of combustion sufficiently to maintain a high temperature within the mantle, which is increased by the heat reflected from the disc, "so that the mantle is kept incandescent in its whole length, and complete smokeless combustion and better utilization of the gas takes place."

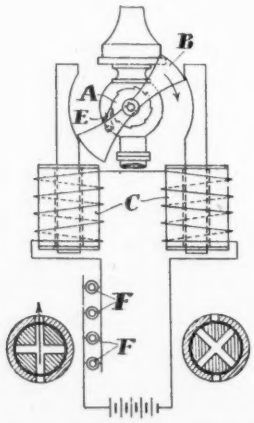
In order to allow the total area of the apertures to be varied, a circular disc E, of approximately the same diameter as the disc B and with perforations of the same size, shape, and arrangement, is adapted to be revolved on it, so that the apertures may be regulated "until the correct flame and complete incandescence of the mantle" are obtained.

Turning On and Off Gas from a Distance.

WENGELIN, J. V., of Gothenburg.

No. 2492; Feb. 4, 1908.

This invention relates to devices of the type in which the armature of an electromagnet is loosely mounted on the controlling plug, and operates it through a ratchet wheel connected with it. The invention consists in the combination of a plug having two passages through it at right angles to each other, an armature rotatable on an extension of the plug, and a toothed wheel rigidly connected to the plug, and operated by a feeding pawl on the armature. It has eight teeth, so that the gas may be turned on or off by one-eighth of a revolution of the plug.



Wengelin's Lamp Lighter and Extinguisher.

At the side of the ratchet wheel A the armature B is mounted on the plug. It is enclosed by the pole pieces of an electromagnet C, and is provided with a feeding pawl D, engaging the ratchet wheel. As the electromagnet is energized by acting upon one of the buttons E, the armature and the plug are turned one-eighth of a revolution in the direction of the arrow, so that the cock is opened and the lamp (provided with an igniting flame) is lighted. When the button is released, the

armature with the pawl will return to its initial position by gravity or by a spring; the pawl then engaging the next tooth of the ratchet wheel. When one of the buttons is again actuated, the armature and the plug will again be rotated one-eighth of a revolution, so that the cock will be closed and the lamp extinguished.

Manufacture of Carburetted Air Gas.

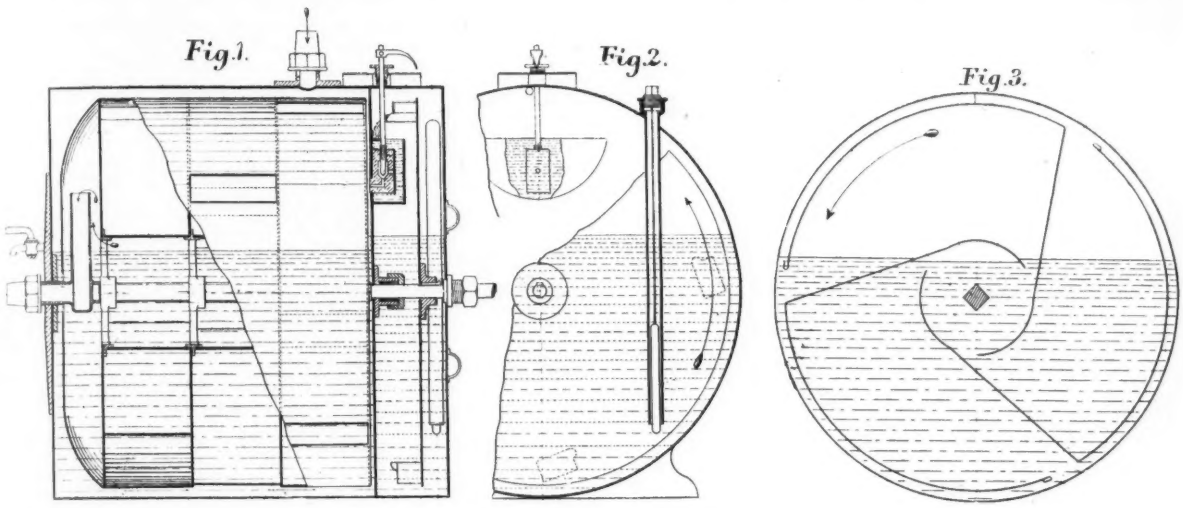
KEY, W., of Glasgow.

No. 9325; April 30, 1908.

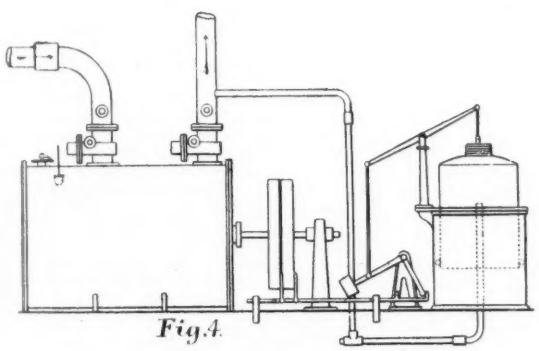
This invention relates to the manufacture of carburetted air gas from petrol, and consists in having the whole necessary apparatus and petrol reservoir arranged within one vessel, operated by only one movement, and that of rotating the central shaft.

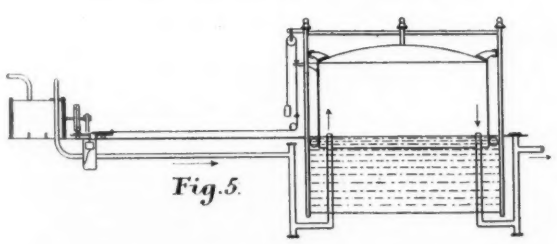
As shown in the illustrations, a cylindrical casing is divided into two chambers. One of these is the reservoir for petrol; the other being occupied by a novel cylindrical drum, which revolves and is partly immersed in a sealing liquid consisting of water with a mixture of glycerine. The drum is divided into several sections by diaphragms which are perpendicular to the axis of the drum. Each section is divided into three compartments by partitions arranged at right angles to the diaphragms, and extending from the periphery of the drum to near its centre. The whole drum is encased by an outer cylindrical shell, in which are arranged inlet ports, one for each compartment of each section; and each compartment communicates by an outlet port with a central passage extending axially through the drum.

The inlet port to each compartment is at its forward end with respect to the direction of rotation of the drum; and each compartment gets filled with air on its inlet port rising above the sealing liquid. The entering air is thus immediately brought into intimate contact with the regulated film of petrol, or the surface of the liquid, and continues in this way to fill until the partition of the compartment extending from the periphery of the drum to near its centre emerges above the liquid. Continuing to rotate, the similar partition of the compartment immediately in front disappears under the liquid, and the port of



Key's Petrol-Gas Turbine Generator.





the compartment just described opens again to the surface of the sealing liquid on the other side of the vessel, and admits the liquid with its regulated film of petrol floating on the surface. The chamber is thus completely filled with air, has enclosed within it also its charge of petrol, and, continuing the rotation, the port becomes sealed, the charge of air and petrol are compressed, and, under pressure, is forced through the outlet port into a central passage, which extends through the centre of the drum, and is common to all the compartments of the drum, and by which the gas thus manufactured is forced through the outlet of the vessel to the gasholder.

The diaphragms separating the several compartments are connected to the central driving shaft, by wheels or spiders, in a manner so as not to interfere with the flow of gas along the central passage. The central shaft extends, by a stuffing-box, through the partition into the petrol reservoir, upon which is fixed a circular disc of nearly the full diameter of the containing vessel. It is secured by a set-pin, and also keyed on to the shaft. Near the outer edge of the disc, and on the side nearest to the drum-chamber, are fixed several cups or buckets for lifting the petrol. As the drum revolves, these cups fill with petrol, and empty it into a high-level fountain, which is attached to the reservoir side of the partition separating the petrol reservoir from the drum-chamber. The petrol is discharged from the fountain into the drum-chamber through the partition by way of a block attached to the partition.

A spindle is provided which is adapted to screw up and down in an internally-threaded portion of the block; the spindle passing through a stuffing-box in the shell of the casing, and being provided with a conical end adapted to engage with a conical portion formed on the passage, so as to regulate, or entirely cut off, the flow of petrol through this passage. The spindle is provided outside the casing with an index and a circular graduated dial, to indicate the rate of flow of petrol into the drum-chamber; while a later improvement supplies the requisite quantity of petrol automatically in relation to the volume of air drawn into the apparatus.

In the illustrations, fig. 1 is a vertical section of the apparatus. Fig. 2 is a cross section looking from right to left. Fig. 3 is a cross section of the revolving drum. Figs. 4 and 5 illustrate means for automatically controlling the rotation of the drum in accordance with the relation between the supply of, and the demand for, the gas.

The apparatus is so constructed that neither during the rotation of the drum nor when it is at rest can any gas or air which has been drawn within it pass back again to the atmosphere. Thus, when the gas is being sent into an ordinary gasholder with its valves open, on stopping the generator it is not necessary to shut the gasholder valves, as no gas can return from the holder through the drum to the atmosphere. The inlet ports are arranged so that no two of them open at the same time; and thus is secured an efficient drive, as well as uniformity of pressure, and by the multiplicity of sections and compartments—these may be any number, from six to thirty or more—a uniform quality of gas is secured.

The carburetted air gas thus produced is said to be a permanent gas, and may be distributed through long lengths of mains and supplied to towns and villages. The gas is reported to have been stored in an ordinary gasholder for months without apparent depreciation; and drip-boxes require little attention, as the gas, having a very small proportion of petrol to air, is found to have no deposit even during frosty weather.

The apparatus may be driven, for small plants, by means of winding wire rope round a drum on the shaft and driving by falling weights, or by a small water engine or motor or hot-air engine, using either its own gas or, for larger sizes, gas coke. An oil-engine or steam-engine is suitable for large works. The latter is preferable, as it is an advantage to have steam in severe frosty weather to keep the air of the generator-house from being too cold, as well as to keep the gasholder lutes and tank water from freezing. The sealing fluid within the generator itself is a non-freezing one.

The air to be drawn in to the gas-generator is preferably previously dried by being passed through a chamber having trays upon which caustic lime has been spread, and afterwards through a wire-work filter, to remove particles.

The apparatus can be constructed as powerful exhausters with an outer casing of cast iron of any dimensions, from the size of ordinary station meters to the massive plant similar to the rotary washers in use in the largest gas-works, and be capable of passing any number of millions of cubic feet of gas per day, or be used to draw gas from gasholders and send it forward into district mains under a greatly increased pressure.

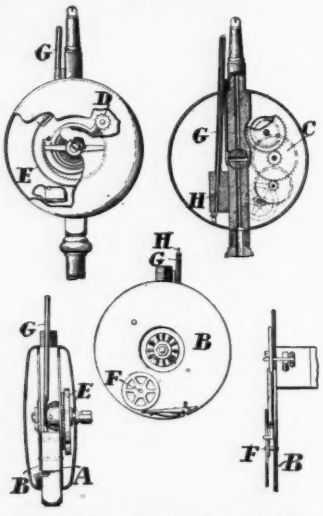
Automatic Gas Cut-Offs.

CAMPBELL, V. E., of Portland, Oregon, U.S.A.

No. 14,005; July 1, 1908.

This invention relates to devices employed for automatically cutting off the flow of gas through a gas-burner in case the flame is accidentally extinguished, or of failure to ignite the gas after the burner has been turned on. The thermostat employed is so arranged and connected that it will be subjected to strain only when cool, and "when in this condition there is less likelihood of permanent injury than where the strain is exerted on a heated thermostat." A further object is to provide that the pressure exerted on the controlling devices shall be uniform at all times without regard to slight variations in temperature of the heated thermostat.

The working parts of the cut-off are supported principally by a vertically disposed tube provided with a bore through which the gas passes. The lower end of the tube connects with the gas-supply pipe, and the upper end carries a nipple for the burner. Arranged within the tube is a tapered plug-valve provided at one end with a handle to be used in moving the valve port into and out of alignment with the main gas-passage. Arranged in the wall of the tube is a small gas-passage, which terminates at the valve-chamber; and the plug-valve carries an auxiliary port which is moved into communication with this passage when the gas is turned on, so that a small quantity of gas may flow outward through a burner orifice (arranged at the side of the main burner) in much the same fashion as a pilot light—this auxiliary burner being used for heating the thermostat element.



Campbell's Automatic Gas Cut-Off.

Secured to the opposite sides of the tube are plates A B, preferably in the form of circular discs, having bearing openings for the arbors of a train of gears C; the first gear of the train being mounted loosely on the projecting end of the plug-valve. This gear is multilated, forming two shoulders which serve, by engagement with a stop-pin, to limit the turning movement of the plug-valve when the latter is automatically restored to its closed position. The multilated gear engages with a pinion D, the arbor of which carries a ratchet-wheel which engages with a pawl on one of the gears of the train, so that the ratchet-wheel may be turned from the multilated gear without transmitting rotative movement to the gear train.

Secured to the hub of the multilated gear is the inner end of a spiral spring E, the outer end of which is secured to a bracket carried by the plate A. When the multilated gear is turned, the spring is placed under stress; and if allowed to operate, it transmits movement to all of the gears of the train, and, further, serves to restore the valve to its closed position. The stem of the valve carries a projecting pin, which is arranged to engage a pin carried by the hub of the multilated gear; and each time the operating handle is turned for the purpose of moving the valve to the open position, the pins engaging the multilated gear are turned, and the spring is placed under stress.

The final arbor or shaft F of the gear train is extended through the plate B, and carries a brake wheel adapted to be engaged by a pivoted brake lever carrying a spring which bears at one end against a pin, and tends at all times to force the lever into engagement with the brake wheel. When the springs are engaged, the gear train is held from movement under the influence of the spring. If, however, the brake lever is moved away from the wheel, and the spring is under stress, the multilated gear is turned; and this movement is transmitted to the valve—the latter being turned to the closed position and cutting off the flow of gas to the burner.

Arranged to one side of the central gas-tube is a small block from which extends a tube G, formed of readily expansible material—the upper end being closed. The upper portion of the tube is arranged immediately adjacent to the auxiliary burner. When heated, it will expand; and when the burner is extinguished, it will contract. Arranged within the tube, and connected to the upper end of it, is a rod H, formed of material having a lower coefficient of expansion than that of the tube. The lower end of the rod is bent outwardly, forming an arm, the free end of which extends through a slot in the plate B, and arranged to engage the brake lever already referred to.

When the flame is lit and the thermostat is heated, the rod H will be pulled up and the arms will not be pressed together. So long, therefore, as the thermostat is heated, the spring is free to act to force the brake lever into engagement with the brake wheel and then hold the train of gears from movement. If the gas is accidentally extinguished, or if the gas is not ignited after the burner is turned on, the thermostat will contract, or will not be expanded, and the two arms will then be pressed forcibly together, and move the lever from engagement with the brake wheel, so that the train of gears is free to operate and turn the valve to its closed position. Thus during the time the thermostat is heated there is no strain on the thermostat, and "there is but little danger of the latter becoming inoperative."

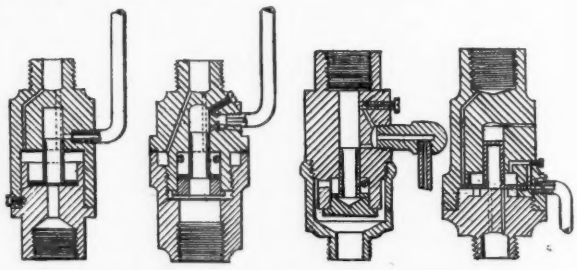
The apparatus as a whole is enclosed within a casing of globular form. The thermostat is disposed entirely below the illuminating burner, and the pilot is interposed between the burner and the thermostat; so that the flame from the pilot will at all times contact with the thermostat, and there is no danger of it being blown away from it. Attention is also called to the fact that the valve simultaneously opens and closes the passages to the main burner and to the pilot.

Controlling the Supply of Gas to Burners.

HANDS, G., of Farringdon Road, E.C., and BREEDEN, F., of Birmingham.

No. 2988; Feb. 10, 1908.

This invention relates to automatic means for controlling the supply of gas to burners, of the kind comprising a piston valve with a hollow stem, in which the piston is annular and is constituted by a flange around the open end of a hollow stem, which may be either open or closed at its opposite end.



Hands and Breeden's Gas-Burner Governor.

Two forms each of the arrangement for upright and inverted burners are shown in the engraving.

It will be seen that the valve is distinguished by having the form of a simple sleeve open at both ends. The sleeve is furnished at one end with a piston-like flange or head, which acts as the valve proper for cutting off the supply of gas to the burner, and is preferably formed at the opposite end with a rounded, bevelled, or knife edge, in order to keep the interior of the cylinder clear of any obstruction, and to some extent to offer less resistance when moving against the pressure of the gas. If desired, according to one modification, the end of the hollow stem remote from the piston may be closed.

In use, when the main burner is extinguished, the valve falls under gravity owing to the pressures being equalized on both sides of the piston-like flange; but when the pressure is decreased on one side by, for instance, opening a tap between the burner and the valve, or when the pressure of the supply is by any means increased, the pressure of the gas upon the piston-like flange raises the valve from its seat.

The supply of gas to the bye-pass may go straight through the stem, and the supply to the burners may be permitted to pass over the periphery of the piston-like flange when the latter rises into an enlarged part of the valve casing; or the opening to the bye-pass may be in advance of the valve, and instead of having an enlarged casing, there may be a tubular ported guide in the casing, and the piston may rise above, or uncover (or partly uncover) the port or ports.

APPLICATIONS FOR LETTERS PATENT.

24,608.—JACKSON, J. D., and MATTERS, J. T. & C. H., "Gas cooking-stoves." Nov. 16.

24,625.—GLOVER, R. B. G., "Gas pressure-gauges." Nov. 16.

24,630.—FRIEDEBERGER, L., "Inverted mantles." Nov. 16.

24,676.—KAMM, L., "Burners for mixed gases." Nov. 17.

24,689.—REESER, H., and BRAY, H. E., "Incandescent gas lighting." Nov. 17.

24,717.—EBERT, M., "Locking device for cocks, with exchangeable padlock." Nov. 17.

24,757.—GIBBS, H., and DALEY, W., "Globe-carriers." Nov. 18.

24,793.—BRÖNDUN, M. W., "Automatic igniters and light extinguishers." Nov. 18.

24,803.—TULLY, C. B., "Manufacture of gas." Nov. 18.

24,807.—SCHULTZE, P., and DOSCH, A., "Meter for measuring gas pressures above or below atmosphere by means of gas-globes arranged on a balance frame." Nov. 18.

24,819.—WALSHAM, W., and HOLLOWAY, E. A., "Igniting outside gas-lamps from within." Nov. 18.

24,849.—TOURTEL, J. M., and MEALING, W. R., "Diaphragm controller for gas lighting and extinguishing purposes." Nov. 18.

24,882.—G. INGLIS & CO., LTD., and INGLIS, G., "Conveyors for coal." Nov. 19.

24,893.—SMITH, H. E., "Production of water gas, with improved method of carburation by means of oils or other heavy hydrocarbons." Nov. 19.

24,901.—FINCKE, F. O. H., "Gas-burners." Nov. 19.

24,917.—NORTON, E., "Charging-machines." Nov. 19.

24,925.—GROSSMANN, A., "Lighting and extinguishing gas-lamps over a distance." Nov. 19.

25,019.—CHIPPERFIELD, W. H., "Compression of gas or air for lamps." Nov. 20.

25,031.—GLOVER, T., "Flexible tubing." Nov. 20.

25,123.—JUNKER, H., "Automatic igniting and extinguishing device for gas-stoves." Nov. 21.

CORRESPONDENCE.

[We are not responsible for opinions expressed by Correspondents.]

Mond Producers and Peat Gas.

SIR,—My remarks on the above subject as given in the "JOURNAL" are misreported; and I must refer you to the "Journal of the Society of Chemical Industry" for the correct report of my statements.

I think it would be very desirable if you would acquaint yourself more intimately with one or two Mond gas plants, after which I am perfectly certain you would cease to write the type of articles which have lately appeared in the "JOURNAL." It is incomprehensible to me why you should in the article on p. 394 again bring in the South Staffordshire Mond Gas Company, whose affairs seem to take up a very large amount of your attention.

39, *Victoria Street, S.W.*, *Nov.* 23, 1908. ARTHUR H LYMN, Manager, Power Gas Corporation, Limited.

[We have no reason to believe that the report (though necessarily somewhat condensed) on p. 415 of the "JOURNAL" for the 10th ult. can be a less faithful rendering of Mr. Lymn's statements, as made at the meeting of the London Section of the Society of Chemical Industry on the 2nd ult., than any report which may ultimately appear in the "Journal" of the Society, though it is true speakers usually are afforded an opportunity of revising proofs of their remarks before they are published in that "Journal." Mr. Lymn should say wherein he considers our report is incorrect, instead of charging us vaguely with misreporting him. The affairs of the South Staffordshire Mond Gas Company naturally call for the attention of an organ devoted primarily to the interests of the gas industry, because that Company has essayed to compete on novel, and we believe technically unsound, lines with established gas undertakings.—ED. J.G.L.]

The Rincker and Wolter System—The Use of Oil Residues and Tar for Gas Making.

SIR,—We have read with interest the article which appeared in your issue of Nov. 24, on the above; and as we may safely claim to be the intermediaries who supply the largest quantity of petroleum residues in this country, we were very pleased to know that they could be used for gas making. We fear, however, the proposition is uncommercial, because, as a matter of fact, gas oil to-day is considerably cheaper than petroleum residue, and therefore we cannot see what benefit gas companies would obtain by using the latter instead of the former. We should, however, be very glad to hear that our opinion is wrong.

In the article referred to, you do not mention anything about the comparative prices of petroleum residues and the present solar distillate, or, as it is more generally known as, gas oil; nor do you give a comparison between the percentage of gas obtained from the residues and from the present gas oil. Perhaps you would be good enough to obtain some sort of comparison between the two articles, and at the same time take into consideration the price, as we think such statistics will be of great interest to your technical readers.

31, *St. Mary Axe, E.C.*, *Nov.* 25, 1908. BENJAMIN AND GEE.

To B. KEITH GREEN.—You have omitted to enclose your address for identification purposes. On its receipt, your letter shall be inserted.

PARLIAMENTARY INTELLIGENCE.

NOTICES GIVEN FOR BILLS (SESSION 1909) RELATING TO GAS, ELECTRICITY, AND WATER SUPPLY.

The following notices for Bills have been given, in addition to those published in the "JOURNAL" last week (p. 571).

Biddulph Gas.—Authority will be sought for the dissolution of the Biddulph, Bradley Green, and Black Bull Gas Company, Limited, and its re-incorporation with increased capital and other powers. Provisions are to be made for the formation of reserve, insurance, and renewal funds, the inspection and regulation of meters, pipes, and fittings, and their exemption from distress, and the testing, quality, and price of gas. The new Company will seek to be enabled to apply for powers under the Electric Lighting Acts.

Blackwood Gas.—It is proposed to dissolve and re-incorporate the Blackwood Gas and Water Company, Limited, with powers of supply in the area defined. In the Bill to be promoted, provisions will be included for the issue of new capital, the adoption of a sliding-scale, the maintenance and extension of the existing works, the supply of ordinary and power gas, fittings, and other matters incidental to gas supply.

Bradford Corporation.—In a General Powers Bill to be promoted by the Bradford Corporation, authority will be sought for the compulsory acquisition of the undertakings of the Pudsey and Drighlington and Gildersome Gas Companies; but the Corporatiou wish to be enabled to make agreements with these Companies with respect to the transfer of their undertakings. They will apply for sanction to the purchase of the private gas-works belonging to the Trustees of the late Sir Henry W. Ripley, and for the confirmation of a certain agreement in this connection, dated Dec. 19, 1907. The water limits of the Corporation are to be specified, and certain existing powers repealed and others substituted. The term "domestic purposes" is to be defined, and the use of water for other purposes restricted. The Bill will contain a number of provisions in regard to the supply of water, including some having for their object its protection from pollution. Additional borrowing powers will be required.

Bury Corporation.—Authority will be sought by the Bury Corporation to maintain and improve their existing gas-works and the railway in connection with them, and supply gas within the borough and a specified portion of the township of Tottington Lower End, in the county of Lancaster. They will ask for power to manufacture and store gas and residual products on lands they may now use for these purposes, make provision with regard to the supply and pressure of gas, alter the illuminating power, specify the mode of construction and the placing of pipes, &c., between mains and meters, and inspect gas-fittings in new buildings. They will apply for authority to make provision in regard to the receipts and payments arising from the gas undertaking, the application of the gas revenue, and the creation of a reserve and depreciation fund. More money will be required.

Cardiff Corporation.—Power will be sought by the Corporation to construct a reservoir on the Taff Fawr, and two conduits or pipe-lines and other works in connection with it. Further general powers will be required with respect to water supply; and the Corporation will ask for the repeal of the portion of their Act of 1879 which imposes upon them any obligations with respect to the price to be charged for water in the Penarth urban district, and for permission to prescribe the water-rates for that district. They also wish to be relieved of the existing restrictions in regard to the use to which the water they may draw from the River Ely is to be put. The Bill will contain various additional financial provisions.

Clevedon Water.—The Clevedon Water Company desire to be dissolved and re-incorporated, with power to supply water in the urban district of Clevedon and in certain parishes in the rural district of Long Ashton, all in the county of Somerset. Authority will be required to maintain, extend, or discontinue the existing reservoirs, mains, &c., to make subsidiary works, and to appropriate waters. The Bill will contain provisions in regard to the supply of water and fittings, and the levying of rents, rates, and charges.

Congleton Gas.—The Corporation of Congleton intend to apply for an extension of their limits of gas supply, so as to include the urban district of Biddulph, and for power to purchase the undertaking of the Biddulph, Bradley Green, and Black Bull Gas Company, Limited. Authority will be sought to alter the prescribed illuminating power of the gas supplied by the Corporation, and the apparatus and burner for testing it, and make further provision in regard to the quality and testing of the gas. Additional borrowing powers will be required.

Conway Gas.—The Corporation of Conway will apply for an extension of their limits of gas supply so as to include portions of the parishes of Llangystenin and Llechwedd, in the county of Carnarvon, and for authority to sell gas in bulk both within and beyond the limits. Power will be sought to raise more money, and to form reserve, insurance, and renewal funds. The Bill will contain provisions in regard to the supply of prepayment meters, fittings, engines, &c., and to the protection from distress of fittings sent out on hire.

Derwent Valley Water Board.—Application will be made by the Derwent Valley Water Board for permission to construct a deviation of the aqueduct and other water-works in the county of Derby which have already been authorized. The Board require an extension of the time specified for the completion of certain works by them and by the Leicester Corporation, or for the repeal of the existing enactments with respect thereto. The Bill will contain provisions with reference to the sinking funds or loans funds of the Board and the Corporations of Leicester and Sheffield, and to the commencement and completion of payments to the former funds; and an extension will be required of the periods specified for the redemption or repayment of borrowed moneys. Further borrowing powers will be applied for on behalf of the Sheffield Corporation.

Donington Water.—Authority will be sought for the incorporation of a Company for the supply of water within the parish of Donington and certain other parishes in the county of Lincoln. Power will be required to construct works, comprising a well and pumping-station, a water-tower, and a line of pipes connecting them. The Bill will contain the usual provisions in regard to the supply of water.

Exmouth Water.—The Exmouth Urban District Council will apply for authority to construct additional works, consisting of a well and pumping-station in the parish of Colaton Raleigh, an aqueduct, conduit, or pipe-line from it to the River Otter, and two similar pipe-lines—one from the new pumping-station to the Squabmoor reservoir at East Budleigh, and the other from this reservoir to the existing mains of the Council in the parish of Littleham. Power will be required to borrow more money.

Fakenham Water.—Authority will be sought for the incorporation of a Company to construct works and supply water within the parishes of Fakenham and Hempton, in the county of Norfolk. The works will comprise a well and pumping-station in the parish of Sculthorpe, a water-tower in proximity thereto, and two conduits or pipe-lines. The capital powers of the Company will be defined in the Bill, which will contain provisions in regard to the supply of water and its protection, the purchase of lands, and the levying of rates and charges.

Fermoy District Council.—The District Council of Fermoy will apply for power to acquire, compulsorily or by agreement, the undertaking of the Fermoy Gas Company, Limited, and, in default of agreement, to provide that "the arbitrator, in assessing the price to be paid to the Company for the purchase of their undertaking, shall have regard to the price at which gas ought to be sold or would have to be sold in the future to enable the Company to retain their present consumers against possible competition." In the Bill to be promoted, provision will be made for the maintenance, improvement, and extension of the existing works, and the supply of gas in the urban district of Fermoy and in parts of the surrounding rural district. Additional borrowing powers will be required.

Glamorgan Water Board.—Application will be made for authority for the constitution of a Water Board, composed of certain local bodies, including the Glamorgan County Council, who have signified their

approval of the scheme. It is proposed to acquire, by compulsion or agreement, the undertakings of the Pontypridd and Garw Water Companies, the Rhymney and Aber Valleys Gas and Water Company, the New Tredegar Gas and Water Company, Limited, the Bridgend (Glamorganshire) Gas and Water Company, Limited, and the Ogmore Gas and Water Company, Limited; also portions of water-supply undertakings outside the county of Glamorgan. On the purchase being completed, the Companies will, of course, be dissolved and wound up. The Bill will define the water area of the Board, and contain provisions in regard to the following matters: Supply of water in bulk to the constituent authorities and others; connection of the several systems; establishment of a water fund; apportionment of expenses or deficiency between the different districts in the water area; contributions by the constituent authorities and the levying and collection of rates, &c.; borrowing powers of the Board and the authorities; creation of water stock; and levying of rates, rents, and charges. Power will be required by the Board to inspect the property of the Companies and of the constituent authorities.

Grantham Water.—Application will be made by the Grantham Water Company for power to construct works, consisting of a dam or weir across the Cringle Brook, an aqueduct, conduit, or pipe-line leading from it, a reservoir in the parish of Little Ponton, and a cut or diversion of the River Witham in connection therewith. Authority will be sought to appropriate the waters of the above-named brook and various springs and streams; and provision will be made for the temporary discharge of water into the streams, the protection of the works, the prevention of the waste or misuse of water, and the repayment of moneys over-expended on capital account. The capital is to be converted and increased, and additional borrowing powers will be applied for.

Herts. and Essex Water.—Application will be made by the Herts. and Essex Water-Works Company, Limited, for an extension of their area of supply, so as to include the parishes of Great and Little Hallingbury and other places in the county of Essex, and for power to construct additional works, consisting of a well and pumping-station, two adits, and a line of pipes. The Company wish to be authorized to purchase by agreement the undertaking and works belonging to any company or person used for the supply of water within the extended limits. Further capital and borrowing powers will be required.

Llanelly Water.—The Urban District Council of Llanelly intend to apply for a definition of their existing limits of water supply, and an extension of them so as to include several places in the parish and district of Llanelly Rural, in the county of Carmarthen. They will also ask for authority to construct new works, consisting of seven lines of pipes, to purchase the mains within the extended limits, and to alter their existing rates. The Bill will contain the usual provisions relating to the supply of water.

Northallerton Water.—The Urban District Council of Northallerton require authority to construct an impounding reservoir on the Oak Dale Beck, various conduits or pipe-lines and two weirs, in the parishes of Osmotherly and Thimbleby. The waters of the above-named beck and the Jenny Brewster's Gill stream are to be impounded. Powers will be sought for the acquisition of lands, easements, and water rights; and provisions will be made to secure purity of the water. Additional borrowing powers are required.

Oldham Corporation.—In a General Powers Bill of which notice has been given by the Oldham Corporation, authority will be sought to use a plot of land at Hollinwood for the storage of gas, and land at Higginshaw for the erection of works for dealing with residual products. Further provisions will be included with respect to the gas undertaking—one relating to testing the illuminating power of the gas, and another to the inspection of gas-fittings in new buildings. In connection with the water undertaking, power will be required to construct new works, consisting of three pumping-stations, a line of steam-pipes, four conduits or pipe-lines, a footpath and a new road, and appropriate for the purposes of their undertaking all such streams, springs, and waters as may be intercepted by these works. Confirmation will be sought of an agreement entered into with Messrs. Platt Bros. and Co., Limited, with respect to the acquisition by the Corporation of an additional source of water supply from the Butterworth Hall Colliery at Milnrow in the county of Lancaster. Additional borrowing powers will be sought.

Pontypool Gas and Water.—Application will be made by the Pontypool Gas and Water Company for power to construct new works, consisting of an intake weir on the Nant Dare, a pipe-line therefrom to a new reservoir on or near the site of the existing one at Penyrheol, a well and pumping-station in the parish of Blaenavon, and various pipe-lines and drifts. Authority will be sought for the continuance and maintenance of the existing works, for the appropriation of the waters of certain specified brooks, springs, and streams, and for the supply of water or gas outside the limits. The Council wish to be empowered to acquire, compulsorily or by agreement, certain lands in the parish of Pontypool for the erection of gas-works, and to make further and better provisions for the supply of both gas and water, including the quality, testing, and pressure of gas. It is proposed to increase the capital and ask for additional borrowing powers.

Pontypridd Water.—The Pontypridd Water Company intend to apply for power to construct a reservoir in the parish and urban district of Pontypridd, two aqueducts, and an approach road. They will ask permission to abandon the railway or tramroad authorized by the Act of the present year, release the money deposited in respect thereof, and apply it in the construction of a railway to be specified in the Bill; also to abandon the Lan Wood reservoir and the pipe-lines in connection with it. An extension of the period limited by the above-named Act for commencing the Llia reservoir is required, as well as the amendment of certain sections of that Act. The Company will apply for power to make agreements with local authorities with regard to the supply of water in bulk, and also to increase their capital.

Risca Urban District Council.—Authority will be sought by the Risca Urban District Council for the purchase, by compulsion or agreement, of the undertaking of the Western Valleys (Mon.) Water and Gas Company, for the maintenance and improvement of the existing works and the construction of new water-works, and the supply of water and gas throughout the urban districts of Risca and Mynyddislwyn and the parish of Upper Machen, in the rural district of St. Mellons, in the county of Monmouth. The Bill will contain the usual provisions incidental to the supply of water and gas, and authority will be asked for the application of the existing revenues to the purposes specified and the raising of more money.

Salford Corporation.—In a General Powers Bill for which notice has been given by the Salford Corporation, authority will be sought for the acquisition and use of certain specified lands in Salford for gas-works purposes; and further provision will be made in regard to the illuminating power, purity, and testing of gas, and the protection of engines, dynamos, and gas and electric fittings in case of foreclosures, bankruptcy, distress, &c. Confirmation will be sought of an agreement made between the Corporation and the Manchester Corporation in regard to water supply; and authority asked for making, in the township of Salford, a minimum annual charge for water, and for the relief of the Corporation from obligation to supply otherwise than upon the payment of a minimum annual charge to be prescribed. Additional borrowing powers will be required.

Sheringham Urban District Council.—The Urban District Council of Sheringham intend to apply for power to purchase the undertaking of the Sheringham Gas and Water Company, maintain the existing works, and supply gas and water within the urban district of Sheringham, in the parishes of Upper Sheringham and Beeston Regis, in the county of Norfolk, and in such other adjoining districts and parishes as may be prescribed by the Bill. Sanction to the raising of more money will be required.

Slough Urban District Council.—The Slough Urban District Council have notified their intention of renewing next year their application (unsuccessfully made this session) for power to acquire the undertaking of the Slough Water Company, maintain the existing works, and supply water within the Company's limits. Confirmation will be sought of any agreement entered into between the Company and the Council, with reference to the proposed transfer, prior to the passing of the intended Act; and provision is to be made for the payment of the expenses incurred in promoting the Bill, and also of the one which failed to pass earlier this session. The necessary borrowing powers will be applied for.

Stourbridge and District Water Board.—Authority will be sought for the constitution and incorporation of a Joint Water Board, and for the purchase, by compulsion or agreement, of the undertaking of the Stourbridge Water Company, Limited; and in the Bill to be promoted, provision will be made for the winding up and dissolution of the Company. Power will be required to maintain and improve the existing works and construct new ones, consisting of a pumping-station, a covered reservoir, and three pipe-lines. The proposed limits of supply are the districts of the Stourbridge, the Lye and Wollescote, and the Amblecote Urban Councils, the parishes of Pedmore, Hagley, and Clent, in the rural district of Bromsgrove, and part of the parish and rural district of Kingswinford. Power will be required to levy rates and charges, borrow money, create water stock, and apply revenues and rates; and it is proposed to give trustees authority to invest in the Board's stock. The usual provisions in regard to the supply of water will be included in the Bill.

Swinton and Mexborough Gas Board.—Application will be made for authority for the constitution and incorporation of a Gas Board for the urban districts of Swinton and Mexborough, in the West Riding of the county of York. The object of the Board is to purchase, by compulsion or agreement, the undertaking of the Swinton and Mexborough Gas Company, acquire their powers, with some in addition, and supply gas within the districts of Swinton and Mexborough and the parish of Ardwick-upon-Dearne. The Bill to be promoted will contain provisions in regard to the price, quality, pressure, and testing of gas, its supply beyond the limits, the regulation of pipes and fittings on consumers' premises, and other incidental matters, also others in relation to the constitution of the Board, and the apportionment of the contributions of the constituent authorities in capital and the adjustment of the profit, losses, and deficiencies. The necessary power to raise money for purposes of the Bill will be applied for.

Wakefield Corporation.—The Corporation of Wakefield will apply for an extension of time for the construction of such of the works authorized by their Act of 1889 (as amended by any subsequent Act or Acts) as have not been completed, and for further powers in relation thereto, as well as to the water undertaking generally. Permission to raise more money will be required.

Wells Gas.—Authority will be sought by the Wells Gas Company to consolidate and convert their preference and ordinary capital, raise more money, increase their borrowing powers, and establish renewal and other funds. In the Bill to be promoted, provision will be made with reference to testing the illuminating power and quality of the gas, the inspection and specification of internal fittings, the supply of gas through prepayment meters, and other matters. The Company wish to be authorized to make application for power to supply electricity.

West Gloucestershire Water.—Application will be made by the West Gloucestershire Water Company for an extension of their limits of supply, so as to include the parishes of Northwick-with-Redwick and Aust, part of the parish of Henbury, and other places in the counties of Gloucester and Wilts. Authority will be sought to acquire lands, springs, and waters, sell water in bulk, levy rates and charges, &c. Further capital and borrowing powers will be applied for, as well as the repeal of the auction clauses in the Company's Act of 1902.

PROVISIONAL ORDER APPLICATIONS (SESSION 1909).

Board of Trade, under Gas and Water Works Facilities Act, 1870.

Bideford Gas.—The Bideford Gas Company will apply for power to construct and maintain additional works, for more capital, and for a modification of their Provisional Order of 1892 with respect to the quality and testing of gas. It is proposed to reduce the illuminating

power to 14 candles, and substitute a "new burner." The Order will contain further provisions and regulations in regard to the supply of gas.

Bradfield Water.—Application will be made by Mr. Herbert Watney, of Pangbourne, or other the undertakers for the time being under the Bradfield Water Order, 1904, for an extension of their limits of supply, so as to include the parish of Stanton Dingley and portions of the parishes of Yattendon, Frilsham, and Ashampstead, in the rural district of Bradfield in the county of Berks. Power will be sought to maintain the present and construct additional works, consisting of a line of pipes and a tank. More capital will be required. The promoters will seek to amend section 16 of the Order of 1904 with respect to the method of charging for water supplied to the buildings and premises known as Bradfield College, and to make other provisions with reference thereto.

Brough Elloughton Gas.—The Brough Elloughton and District Gas Company will apply for power to define and regulate the existing capital, raise more money, and make provisions in regard to the price, quality, pressure, and testing of gas, its supply through prepayment meters, the size and material of pipes and fittings, and other matters.

Bude Gas.—The Bude Gas Company intend to apply for authority to maintain their works, extend their area of supply so as to include the parish of Kilkhampton, and increase their capital.

Comber Gas.—Application will be made by the Comber (Co. Down) Gas Company for authority to maintain, continue, and construct gas-works, manufacture and store gas, convert residual products, supply gas engines and fittings, &c., and levy rates and charges. Additional capital will be required.

Compstall Gas.—The Calico Printers' Association, Limited, require authority to continue their existing gas-works, construct additional works, and conduct a gas undertaking in the parish of Compstall, in the county of Chester, and part of the parish of Ludworth, in the county of Derby. The Order will contain provisions in regard to the price, quality, pressure, and testing of gas, its supply in bulk, the erection of dwelling-houses for the employees, the levying of rates and charges, &c.

Crickhowell Gas.—The Crickhowell Development Syndicate have notified their intention of applying for power to construct works and manufacture and supply gas in and around the town of Crickhowell and the adjacent village of Llangattock, in the county of Brecon. They purpose acquiring, if possible, the existing gas-works and plant from the executors of the late proprietor, and forming a Company to raise capital to improve them or construct new ones to afford a better and cheaper supply of gas. In the event, however, of the Rural District Council resolving to undertake the supply, the promoters are willing to retire in their favour on being reimbursed their costs and expenses.

Gravesend and Milton Water.—The Gravesend and Milton Water Company will apply for power to construct additional works, consisting of a well, pumping-station, two adits, a covered service reservoir, and a line of pipes in the parish and urban district of Northfleet, and an elevated tank and two pipe-lines in the parishes of Northfleet, Gravesend, and Milton-next-Gravesend. More capital will be required.

Hayfield Gas.—The Hayfield Gas Company, Limited, will apply for authority to maintain and continue their existing undertaking, construct additional works, and manufacture and supply gas in the parish of Hayfield, in the county of Derby. The present capital is to be regulated, and power to raise more will be sought.

Hungerford Water.—Authority will be sought, by the Hungerford Water-Works Company, Limited, to supply water from their existing well and works, and purchase additional lands for the construction of wells and water-works.

Kingswood Water.—The Kingswood Water Company, Limited, will apply for power to maintain, continue, and improve their existing works, and supply water in the parish of Kingswood, in the county of Surrey; also to sink a well and erect a pumping-station at Clears, in the parish of Reigate, a reservoir on Colley Hill, in the same parish, and a water-tower in the parish of Kingswood.

Langley Mill and Heanor Gas.—Authority will be sought by the Langley Mill and Heanor Gas Company, Limited, to extend their limits of supply, so as to comprise the portion of the parish of Codnor-cum-Loscoe, in the urban district of Heanor, which is not included in the limits of supply of the Riddings District Gas Company, and several other places in the county of Derby. They will also apply for power to acquire additional lands for the storage of gas and residual products, and to raise more capital.

Llynvi Valley Gas.—The Llynvi Valley Gas Company, Limited, will apply for power to raise additional capital, and make provisions in regard to the quality, pressure, and testing of gas, its supply through prepayment meters, the size and material of the pipes and fittings to be used by consumers, the sale of gas in bulk, and other matters.

Long Eaton Gas.—Application will be made by the Long Eaton Gas Company for power to acquire the undertaking authorized by the Sandiacre Gas Order, 1905; construct and maintain additional gas-works; and extend their limits of supply so as to include the parishes, townships, or hamlets of Sandiacre, Stanton by Dale, Dale Abbey, Kirk Hallam, and Hopwell, in the county of Derby. Further provision is to be made with regard to the quality and testing of gas; and for this purpose the Company will apply for the alteration or repeal of the sections of their Act of 1901 relating thereto. Additional capital will be required.

Prestatyn Gas.—Notice has been given by Lady M'Laren, of Bodnant, in the county of Denbigh, of her intention to apply for permission to raise additional capital, with increased borrowing powers, for the general purposes of her gas undertaking at Prestatyn, and for such other purposes as may be authorized by the Order. The Prestatyn Gas Order of 1892 is to be amended.

Settle Gas.—Authority will be sought by the Settle Gas Company, Limited, to raise additional capital, acquire by agreement a certain piece of land in the township of Settle, and hold it for the purposes of their gas-works.

Sutton and Hooton Gas.—The Sutton and Hooton Gas Company will apply for power to construct and maintain new works for the manufacture and storage of gas and residual products on land now in their possession, extend their limits of supply so as to include the townships of Eastham and Oberpool, in the rural district of Wirral, and increase their capital.

Local Government Board, under the Public Health Act, 1875, and the Gas and Water Works Facilities Act, 1870.

Birkenhead Corporation.—Authority will be sought by the Birkenhead Corporation to store gas and residual products on certain lands in the parish of Birkenhead, and to use them for any of the purposes of their gas undertaking other than manufacture.

Ilkeston Gas.—The Ilkeston Corporation intend to apply for power to purchase by agreement certain lands for the purposes of their gas undertaking, and to erect thereon works for the manufacture and storage of gas and the treatment of residual products. It is proposed to amend the Ilkeston Gas Order of 1878 in regard to the quality, pressure, and testing of gas, and the size and material of the pipes and fittings to be used by consumers. Additional borrowing powers will be required.

Ynyscynhaiarn Gas.—The Urban District Council of Ynyscynhaiarn, in the county of Carnarvon, purpose applying for authority to purchase by agreement certain lands for the purposes of their gas undertaking, and erect thereon gas and other works, supply gas, fittings, and other apparatus, and levy district and gas rates, rents, and charges. Additional borrowing powers will be applied for.

Secretary for Scotland, under the Private Legislation Procedure (Scotland) Act, 1899.

Coatbridge Gas.—Application will be made by the Coatbridge Gas Company for authority to reduce the illuminating power of the gas from 20 to 15 candles.

Glasgow Corporation.—The Corporation of Glasgow propose applying for an amendment of the Glasgow Police Act, 1866, with respect to the charges made for lighting private streets and courts and common stairs.

Haddington (Western District) and Edinburgh Water.—Power will be sought by the County Council of Haddington, the Western District Committee of the Council, and the Edinburgh and District Water Trustees to acquire certain lands, servitudes, and easements, and by the first-named bodies to contract with the Trustees for a supply of water in bulk. Authority will be required by the latter for supplying beyond their limits, and also for making agreements with other local authorities. A tank or reservoir and two conduits or pipe-lines are to be constructed by the Council, and a number of other conduits, &c., by the Trustees. The limits of the Council and the Committee in regard to the supply of water will be defined. Additional borrowing powers will be required.

Motherwell Burgh Extension.—The Corporation of Motherwell will apply for an extension of the boundaries of the burgh; and provision will be made in the Order for the inclusion of the whole of the existing burgh, as well as the districts proposed to be annexed, within the limits of compulsory water supply. It is proposed to require the County Council of Lanark and the Middle and Upper Ward Districts respectively, or any of them, to take and pay for the supplies of water referred to in the Motherwell Water (Additional Supplies) Act, 1900. Additional borrowing powers will be required.

Musselburgh Corporation.—It is proposed by the Corporation of Musselburgh to apply for an extension of the boundaries of the burgh, and for the inclusion within the enlarged water limits of the several districts annexed. Provision will be made for the dissolution of any local, or other authority in an added district, and for the raising of more money.

Musselburgh Gas.—The Musselburgh Gas Company will seek to be dissolved and re-incorporated with additional capital and borrowing powers. Confirmation of the sites of the existing works will be sought, as well as powers for the maintenance and extension of the latter. The limits of supply are the parish of Inveresk, including Musselburgh; but provision will be made for the supply of gas in bulk beyond the area, as well as for the alteration and definition of its illuminating power.

St. Andrews Water.—Application will be made by the Corporation of St. Andrews for power to construct additional water-works, comprising a reservoir and a tank on Cameron Burn, another tank in the parish of Cameron, three conduits or pipe-lines, and various diversions of roads, &c., in connection therewith. In the Order to be applied for, the limits of supply will be defined and extended; and authority will be sought to sell water to local authorities and other public bodies both within and beyond them. Additional borrowing powers will be required.

Wemyss and District Water.—The Corporation of Wemyss intend to apply for the abolition or alteration of the existing local and water authorities within the special water supply districts of Wemyss, Buckhaven, Mettill, Innerleven, Windygates, and Balcurvie, and of their powers and jurisdictions, and the constitution of a public Water Trust, to whom it is proposed to transfer the works, powers, debts, and liabilities of the existing authorities. The Order will confer upon the suggested Trust authority to construct works, take and impound waters, and provide an additional supply within extended limits. Further borrowing power will be required.

Extensive Street-Lamp Breakages at Smethwick.—Some days ago, at the Smethwick Police Court, four youths were fined varying sums for breaking a street-lamp belonging to the Corporation. Mr. Skidmore, on behalf of the Gas Department, stated that they had suffered greatly in the Londonderry Lane district from the damage. In one month, the damage amounted to £30; the average being six lamps broken a week. Since a recent conviction at Oldbury, however, the damage had been greatly reduced; there being only three broken in a month.

LEGAL INTELLIGENCE.

THE SUPPLY OF LISTS OF SHAREHOLDERS.

High Court of Justice—Chancery Division.

(*Before Mr. Justice* WARRINGTON.)

Last Friday, the case of *Davies v. Gaslight and Coke Company*, which came before his Lordship on the 30th of October (see *ante*, p. 355), was again under consideration.

Mr. H. TERRELL, K.C., moved, on behalf of the plaintiff, that a subpœna *duces tecum* issued by the defendants and served on the plaintiff might be set aside, on the ground that it was an abuse of the process of the Court. The writ in the action asked for a *mandamus* commanding the defendants to supply the plaintiff, who was a shareholder, with a copy of the names and addresses of the other shareholders in the Company, under section 10 of the Companies Clauses Consolidation Act, 1845, which they refused to let him have. The action was set down for trial without pleadings, and would come on next Thursday. He understood that the defence was that the plaintiff was the Secretary of several Companies—the Amman Valley Gaslight and Coke Company; the Water-Works, Lighting, and Power Investment Corporation; the Laindon and District Gaslight, Coke, and Water Company; the East Sussex Gaslight, Coke, and Water Company, Limited; and the Whitland and District Water and Gas Company, Limited. They said the second of these Companies was one which promoted gas and water companies; that they had promoted the four others named in the list; and that if the plaintiff obtained the list he sought, he would use it for the purpose of sending out prospectuses, &c., to the shareholders of the defendant Company, and that this was not a proper reason for obtaining it. The subpœna contained a schedule of a large number of books and documents, including contracts, balance-sheets, minute-books, &c.; and the plaintiff, in his affidavit, said that it would require a van to bring them to the Court, that he was not authorized by the Directors of the various Companies to produce them, and that none of them could by any possibility be material or relevant to the question at issue in the action.

Mr. R. J. NEVILLE (instructed by Messrs. Monier-Williams, Robinson, and Milroy) said if his Lordship thought, on hearing the circumstances of the case, that the plaintiff ought to have a list of the shareholders, the defendants were quite prepared to give it to him; but they considered that before so deciding his Lordship should know the character of these promoters, who all carried on business at the same place, with the same prime minister and the same home secretary—Mr. H. Percy Davies. He thought he should be able to show that they were of such a character that, both with regard to the promises made and the chances of performance, no assistance ought to be given by the Court to the procuring of further dupes.

Mr. TERRELL objected to statements being made which were not in evidence.

Justice WARRINGTON said he did not think these matters should be gone into in detail. He understood the general nature of the defence—that the plaintiff was going to make some use of the list to which the defendants objected.

Mr. NEVILLE said the *modus operandi* was this: There were three promoting Companies with high-sounding names, the Secretaries of which had been subpœnaed, and they were all carried on at the same place, and played into each other's hands.

Mr. TERRELL renewed his objection.

Justice WARRINGTON said Mr. Neville had to justify the serving of a subpœna on the plaintiff, to bring a number of books and documents which he held as Secretary of another Company.

Mr. NEVILLE said if the plaintiff told the Court that the production of these documents had been refused, no further question would arise; but he only said he had no authority to produce them. The proper way was to say that the Directors refused to allow their production. His (Counsel's) point was simply this—that if these Companies were of the character he was instructed they were, he should have to put before the Court evidence to this effect. For instance, the question of dividends could be easily ascertained by the documents which under the subpœna were only produced for the assistance of the Court, and could not be looked at by the other side without the permission of the Court. It appeared to him that this motion was based upon an application recently made, in which two Cabinet Ministers were concerned; but that case was quite different from this, because, though here there was a cabinet of company promoters, with a prime minister and a home secretary, the whole of the facts were in the breasts of these gentlemen, who knew all about them, and who wanted to get the list in question to assist them in palming-off on the investing public what were sometimes called "wild-cat" schemes, which the Court would certainly not look upon with any favour.

Justice WARRINGTON, having stated the nature of the action and the defence, which was to the effect that the plaintiff, if supplied with the list, was likely to make use of it in a way which defendants thought objectionable, remarked that whether or not the defence was well founded he could not say until he had heard it. Meanwhile, the action had been set down for trial, and would soon come on. The defendants had served the plaintiff with a subpœna *duces tecum*, requiring him to produce at the trial the books and documents specified in the schedule; in which there were an enormous number of contracts, books, and documents relating to the affairs of certain Companies of which the plaintiff was the Secretary. The plaintiff had made an affidavit in which he said that these books were very voluminous and bulky, so that it would require a van to bring them to Court; that they were only in his custody as Secretary; and that he had not the authority of the Companies concerned to produce them. He also said he was advised that none of them were material as evidence in the action, and could not help in getting the matters in dispute decided. Under these circumstances, he did not think he ought to allow the subpœna to stand. It seemed to him that no real attempt had been made to specify the documents which were really considered material, but a subpœna had been served to produce every document the defendants could think of as being possibly in the possession of the plaintiff. He did not consider it was a proper subpœna, and he must set it aside; the costs of the application to be the plaintiff's in any event.

Mr. TERRELL then made a similar application with regard to a second subpœna, served upon Mr. P. Williams, the Secretary of another Company, and to a third on behalf of Dr. Allan Maclean, who, he said, was a member of the Bar and a Director of one of the Companies referred to.

Mr. NEVILLE endeavoured to support the serving of the subpœnas; but in each case a similar order was made—the costs to be paid by the defendants.

UNJUSTIFIABLE ACTION AGAINST DIRECTORS.

High Court of Justice—Chancery Division.

(*Before Mr. Justice* WARRINGTON.)

Last Friday, his Lordship had before him a motion, on behalf of the defendants in the case of *Jones v. Aberystwyth Gas Company*, to stay all proceedings, on the ground that the action was frivolous and vexatious; or, in the alternative, to strike out the statement of claim, as showing no reasonable cause of action.

Mr. SHELDON, in support of the motion, said the proceedings were taken by the plaintiff, on behalf of himself and the other shareholders, against the Company and the Directors, with regard to whom certain allegations extending to mismanagement and the retention of moneys which belonged to the Company, were made. Every matter alleged was one in which the Company were interested, which the Company could confirm, and therefore in which primarily the Company ought to sue, because everything claimed in the action would come into their coffers. The plaintiff could sue on behalf of himself and the other shareholders if he could show that he was overborne by a majority, and that the persons of whose acts he was complaining formed the majority. But there was no allegation of this sort in the statement of claim; and there was evidence that it was not the case. Counsel then went through the statement, which commenced by setting forth that the plaintiff was the holder of 43 shares in the Company. This, Counsel said, was true at the date of the issue of the writ; but on the 24th of September 42 of them were transferred, so that now it was an action by the holder of one share out of a total capital of £35,000. The statement of claim went back to 1898, when the Company promoted a Bill which included powers to acquire a new site for the gas-works, and alleged a number of things against the individual Directors, some being of the most trivial character—such as having the use of a gas-stove for a certain time without paying for the hire of it. The main charges, however, were with regard to the purchase of the land for the new works, for which it was alleged that an extravagant price had been paid, and that the land was less suitable than other land which was available. Other charges were with regard to paying dividends out of capital, and depressing the value of the shares for the purpose of acquiring them at a low price.

Justice WARRINGTON said he had read the statement through, and considered the claim was plainly one which ought to be made by the Company.

Mr. SHELDON having read an affidavit by Mr. A. J. Hayles,

Mr. ROWDEN, K.C., who appeared with Mr. GWYNNE JONES for the plaintiff, submitted that, as a shareholder, he was entitled to bring the action, if his rights were overborne by a majority.

Justice WARRINGTON remarked that there was no allegation of this sort.

Mr. ROWDEN said he might put in such an allegation by amendment.

Justice WARRINGTON said if an application was made for leave to amend, he should have to consider whether it was made *bonâ fide*. He was not bound to allow an amendment which would prove to be of no use.

Mr. ROWDEN argued the case further for some time, and was then followed by Mr. GWYNNE-JONES.

Justice WARRINGTON, in giving judgment, said the application was founded on Order 25, Rule 4, and also on the inherent jurisdiction of the Court to prevent the abuse of its own process. Having read the rule in question, his Lordship said the action was by one shareholder, on behalf of himself and all the others, complaining of matters in which not the shareholder but the Company were interested. He claimed relief which in every case, without going through it in detail, must inure to the benefit of the Company. It was perfectly well known that facts of this nature did not give a shareholder any cause of action. There was one case, however, in which he was entitled to sue on behalf of himself and all the other shareholders, and that was when he was being defrauded by the Company—when the majority controlling the Company were the persons of whose actions he was complaining. This case, so far as the statement of claim was concerned, did not disclose any cause of action in the plaintiff, because every head of relief which he asked would, if granted, result in benefit to the Company, and not to the shareholder. The statement of claim must therefore be struck out; and this being so, he should be entitled to direct the action to be dismissed. But it was suggested that, though this claim did not disclose any reasonable cause of action, the plaintiff was at liberty to amend it, and that if he amended by inserting an allegation that the Directors controlled the Company, and prevented him suing in the name of the Company, he would be entitled to maintain the action, and that the statement of claim ought to be treated as amended. If he did this, then he (his Lordship) was asked, under the inherent jurisdiction of the Court, to say that the action was frivolous and vexatious, and to stay it on this ground; and this he should certainly feel it his duty to do. It seemed to him that there was not the slightest chance of the plaintiff ever being able to show that the Company was under the control of the Directors who were here sued. Under whichever head the application was treated, therefore, he must make an order dismissing the action; and the plaintiff must pay the costs.

A QUESTION OF CONTRACT.

An interesting point arose in a case at Tottenham Police Court last Thursday, in which William P. Griffiths was summoned by the Enfield Gas Company for £4 9s. 5d. for gas supplied from March 20 to Sept. 21, to provision stores in High Road, Ponder's End. The defendant until a short time ago carried on business at a number of places in and near London as a grocer and provision dealer. Mr. W. Windsor, who appeared for the Company, said that probably the defendant would not deny that the gas had been supplied; but in the course of correspondence he had raised the point that he was not liable because he did not consume it himself. The original contract, however, was with him; and this provided that a written notice must be given at the office of the Company if he desired the supply to be discontinued or altered. No notice was received by the Company until Sept. 21 of any change in the proprietorship of the stores at Ponder's End. When a demand was made upon the defendant for gas supplied to that date, he replied that the account was payable by a Mr. Knapman. Another letter was received, stating that the defendant's responsibility ceased on Jan. 22 last, when he assigned all his assets to a Trustee, who carried on business at the premises in question. The Trustee, it was said, had ample funds in hand; whereas if judgment were recovered against the defendant, he would be unable to pay. Mr. Windsor said there was no doubt about this assignment; but the defendant's liability to the Company remained, as his contract was not broken. The defendant might have the right to recover the amount against a third party. Evidence in support of the opening statement having been given, defendant declared that the Company knew he was not responsible, as they had received cheques from Mr. Knapman. He called a witness, who said he knew cheques in connection with the business were sent out by Mr. Knapman. Mr. Griffiths had been in the office as General Manager, and had been drawing a salary, but had not signed cheques. Replying to Mr. Windsor, however, he said that Mr. Knapman signed the cheques in the name of Griffiths. The Bench ordered the amount to be paid, with costs; allowing the Company a guinea as Solicitor's fee.

THEFT IN THE DUNDEE GAS OFFICE.

On Friday last, John Watt, the caretaker in the Dundee Gas Office, was brought before Sheriff-Substitute Campbell Smith in the Dundee Sheriff Court, on a charge of stealing tramway tickets and matches, of the value of 3s. 9d. He pleaded not guilty.

Mr. A. Don, a clerk in the meter and complaint department, stated that the tramway tickets were given to outside officers in connection with their work. For some months he had been missing these checks and matches; and he reported the matter to the Treasurer. After this several methods were tried to discover the pilferer. For a fortnight his own keys and those of his assistants were given over to the Superintendent; but during this time the pilfering went on. On Oct. 23, the police were informed. Besides locking his desk, he sealed it; and on several occasions the seal was broken. On Nov. 5, he, along with two detectives, engaged an office for the night directly opposite the gas office, from the windows of which they could see his desk. At 9.20 the accused entered that part of the office, produced a bunch of keys, and opened the desk. They saw him take some of the tramway tickets. The detectives went over and arrested him. Witness opened his desk, and found that tramway tickets to the value of 8½d. were missing. The keys the accused had belonged to an official now dead. They opened no fewer than twenty lockfast places in the office.

Mr. J. B. Thomson, the Superintendent in the office, stated that till last July it had not been the practice to collect their keys from persons who left the service, or from the representatives of those who had died; but since then it had been strictly done. It was well known in the office that all duplicate keys had been called in, and should be delivered over; it was the common talk of the office.

Superintendent Lackie said that, when charged, the accused said "I took the checks. You might hush it up, and I will never go back to the box again."

The accused, in giving evidence on his own behalf, said he had been in the habit of having a good deal of money passing through his hands. On one day he drew and banked £2000. On Nov. 5 last, he had no tramway checks in his possession; and as he had often to go out, after the office was closed, to gas escapes and fires, he went to Mr. Don's desk and took out a few checks. He ought to have asked for the checks before the office closed; but it escaped his memory. He would have told Mr. Don in the morning what he had done. He had no intention of stealing. The keys he had he found; and he intended to hand them over after the alterations which were going on in the gas office were completed.

The Sheriff said he was very sorry to pronounce a verdict of guilty against a man with grey hairs, and a man who had been, so far as discovered, a faithful servant in the office for forty-four years. All he felt justified in convicting him of was the last charge—that of stealing tramway tickets of the value of 8½d. The real punishment that had fallen upon the accused was to have his character blasted at 68 years of age. He was not sure that there had not been an excess of vigilance in this case, although he would not say it was condemnable. He passed sentence of a fine of 21s., with the alternative of eleven days in gaol.

Melbourne Water Supply.—According to a telegram received through Reuter's Agency, the Metropolitan Board of Works of Melbourne are raising a loan of £1,000,000, which is to be devoted chiefly to water undertakings.

Theft of Gas-Fittings.—At the County of London Sessions last Wednesday, before Mr. R. Wallace, K.C., John Oliver, a dealer, was indicted for stealing a quantity of gas-fittings and other articles, the property of the Gaslight and Coke Company, in two unoccupied houses in Meredith Street, Clerkenwell, belonging to the Skinners' Company. The Jury returned a verdict of "Guilty." The prisoner, who had hitherto borne a good character, was bound over under the Probation of Offenders Act.

MISCELLANEOUS NEWS.

GLASGOW AND AUTOMATIC STREET LIGHTING.

At the Meeting of the Glasgow Corporation on the 26th ult., the Lighting Committee brought up a report stating that in August last the Engineer and Manager of the Gas Department (Mr. Alexander Wilson), and the Inspector of Lighting (Mr. S. B. Langlands) had been authorized to visit several towns in England where automatic lighting and extinguishing apparatus for street-lamps had been in use for some time. These officials had now submitted the results of their observations.

They suggested that any automatic lighting which might be installed in Glasgow should, in the meantime, be done by a clockwork type of controller. At present, this type would suit their requirements best because of the varying pressures throughout their great area of supply, and also because of the difficulties which had been experienced in a greater or less degree when pressure controllers had been used in other cities. As the "Horstmann" controller appeared to be the type which had given the greatest satisfaction, they suggested that one man's beat of (say) 240 lamps should be fitted with them. This would entail a first cost of about £480, and would give the system a good practical test. Each lamplighter at present received £67 12s. per annum for looking after 118 lamps. If, under the new system, he could look after double the number, a considerable saving would be effected. A further saving on the gas used might also be made, as they could curtail the lighting hours until the last possible moment, whereas at present they had to send the men away an hour before dark to begin their lighting-up.

Mr. Wilson and Mr. Langlands, in a detailed report, said the first town they visited was London. They were met by the officials of the Lighting Department of the Gaslight and Coke Company, who had been carrying on extensive tests with Dr. Rostin's apparatus for the automatic lighting and extinguishing of street-lamps. This type of apparatus was actuated by increasing the pressure on the gas-mains. There were 160 of the appliances fitted to the lamps throughout Lambeth and Chelsea, and about 500 in the Kensington district. At night the deputation chose a position from which they could see 25 lamps at once, and timed the working of the apparatus. The first of the 25 lamps lit up at 7 o'clock, and the last at 7.20. This was a big variation, and showed that the controllers were not accurately adjusted. The following night the same results were obtained at Kensington, where 50 lamps were under observation. In both instances, all the lamps lit. The Gaslight and Coke Company were so satisfied that they talked of installing another 2000 of the "Rostin" controllers. The bye-passes burned continuousiy, and used ⅓ cubic foot per hour. Some of the objections to this type of apparatus were that the increasing of the pressure above the normal in the mains in some cases caused the water-seal to be blown from gaseliers in the district. If a fog should come on, and extra pressure be put on the mains to meet the demands of the city, the abnormal pressure which resulted if the fog lifted suddenly caused the lamps to light-up in broad daylight. Again, to obtain instantaneous lighting-up, very careful adjustment would require to be made, if the area being covered were not a level one. A strange feature to the deputation was that the mantle consumption was higher with this controlling apparatus than in the lamps lit by the torch. The "Rostin" apparatus cost about £2 for each lamp.

In Bath, the "Horstmann" clockwork controller was installed; and the gas engineer expressed himself satisfied with the results he was obtaining from it. Every lamp was controlled separately; and they were not, as in the pressure-raising system, subject to fluctuations of pressure. The deputation found that about 15 minutes elapsed between the first and the last lamp lighting up.

In Bristol, the "Gun-Fire" clockwork controller was used; and the authorities were thoroughly satisfied with it. At night, the first lamp lit up at 7.28, and, watching twelve, the last one at 7.45. Manchester had tested the "Gun-Fire" controller in a half-hearted manner; but the Corporation intended this winter to go more fully into the matter with two other makes of clockwork controllers—the "Horstmann" and the "Tourtel." What interested the deputation most was Manchester's installation of three-light "Graetzin" inverted lamps in the streets. This was the Berlin system of lighting; and testing these lamps photometrically against one of their four upright burner lamps, the deputation found that the "Graetzin's" efficiency was the higher. The Salford Inspector of Lighting, who was in Manchester, said that he had been testing the "Gun-Fire" controller, but he was not quite sure that his Corporation would be able to instal any system of automatic lighting, owing to their naphthalene troubles. In Glasgow, however, they had not to contend with this worry, as Scotch gas was, so far, free from naphthalene.

In Liverpool, the most extensive tests had been made with controllers; and the Inspector of Lighting there was so satisfied that a saving could be made that he had asked his Council to instal some thousands throughout the city. He had tried most of the types of clockwork controllers; but the "Horstmann" and the "Gun-Fire" were the only two that had been extensively fitted so far. His preference was for the "Horstmann"—the one which they (the deputationists) reported favourably on from their own experiments—the reason for the preference being that it was self-adjusting as regarded lighting hours, and merely required weekly winding. The "Gun-Fire" required weekly winding and weekly adjusting. In 480 burners placed under automatic control, the average failures to light had only been 16·7 per month. The Liverpool Inspector of Lighting had these lamps fitted with a bunsen bye-pass which was only consuming $\frac{1}{10}$ cubic foot of gas per hour. This was one of the smallest bye-passes the deputation had ever seen, and was quite a new thing.

The Committee recommended the adoption of the "Horstmann" controller as an experiment; and, after consideration, the matter was adjourned.

LIGHTING OF LONDON COUNTY COUNCIL COTTAGES.

Gas to be Used Instead of Electricity.

At their Meeting last Tuesday, the London County Council had before them two recommendations by the Housing of the Working Classes Committee, having reference to the lighting of certain cottages on the Totterdown Fields Estate. As was stated in last week's "JOURNAL," these cottages have up to the present been fitted for electric light under an arrangement with the County of London Electric Supply Company. Difficulties arose, however, with regard to the fixing of the wires, and therefore the Committee suggested—(*a*) That an agreement be entered into with the County of London Electric Supply Company cancelling and determining all existing agreements as to the lighting by electricity of cottages on the Totterdown Fields Estate, and providing that the Council will not for ten years introduce any other system of lighting in the cottages which have already been installed with electric light. (*b*) That an agreement be entered into with the Mitcham and Wimbledon District Gaslight Company for the lighting by gas of cottages on the estate not yet installed with electric light.

Recommendation (*a*) was at once agreed to; but Mr. W. C. Johnson sought to amend recommendation (*b*) by adding the words, "and that such agreement include a clause safeguarding the tenants of the Council as to the quality of the gas supplied." The outside gas companies of London, he said, supplied gas of inferior quality, and very much below the standard. Last year, four tests were made of the gas supplied by the Mitcham and Wimbledon Company, and instead of it being of 14-candle power, the gas was, on July 22, 12·5 candles; on July 23, 12·3 candles; on July 24, 12·4 candles; and on July 26, 12·5 candles. The Council had no statutory right to test the gas of the Wimbledon Company, as they had of the other gas companies; and he thought when they were making a definite agreement with them to supply gas on the Totterdown Fields Estate they had an opportunity of safeguarding the interests of their own tenants, and the larger consumers of gas in the county. No harm could possibly be done by the amendment.

The amendment having been seconded, Mr. W. R. Green said he could not accept it without knowing what Mr. Johnson meant. He was given to understand the interests of the tenants were quite safe under the agreement proposed.

Mr. J. D. Gilbert hoped the Chairman of the Committee would reconsider the matter, because it meant a good deal to the tenants on this particular estate. If the Company were allowed to charge London prices and to supply a lower candle-power gas, the Council were going to impose a very great charge upon these particular tenants. He suggested an agreement should be made with the Company, either that the gas supplied should be of equal candle power to that furnished in London or, if not of such candle power, there should be a reduction in the price of the gas.

On a show of hands, the amendment was defeated by 17 votes to 16; and the recommendation of the Committee was adopted.

REFUSING AN ORDER FOR ELECTRICITY.

Corporation Object to Assisting a "Rival Light."

The use of gas-engines for generating electricity is a familiar occurrence; but a Sunderland tradesman who has sought to, in a measure, reverse this order of things, and employ an electric motor in connection with a high-pressure gas installation, has met with a prompt refusal from the Municipality, who have in their hands the dispensing of this form of energy in his neighbourhood. Being a business man himself, this example of the "business" ideas of the Sunderland Corporation—the authority concerned—has so astonished him that he has communicated his grievance at length to the "Sunderland Daily Echo." His statement is a good object-lesson; and therefore we cannot do better than reproduce it in his own words, which are as follows.

Kindly favour me with space in your valued columns to make public the latest freak of the Corporation Electricity Department. While it is a personal matter to me, it yet involves considerable public issues, and is therefore of importance to the ratepayers generally, and especially to consumers of electricity. In equipping new business premises in High Street, I have deemed it wise to forsake electricity as a luminant, and have contracted for an installation of high-pressure gas. For this purpose, requiring "power" of some kind to drive a small engine, I applied to the Borough Electrical Engineer for a supply of electricity. After a delay of three days, I was verbally informed that the Corporation decline to supply me with the current; and the reason assigned is that it is to be used, not for lighting purposes direct, but as an adjunct to a rival light—namely, gas.

Naturally, the first question arising is, Have the Corporation legal power to refuse to supply current to a responsible ratepayer who demands and is ready to pay for it? I think the popular answer will be "No!" but Alderman Bruce in an interview says, "Yes." I leave a legal point like that for lawyers to decide. But the question then occurs, Apart from legal power, is it just and equitable to refuse power to a ratepayer, who as such is a partner and shareholder in a co-operative undertaking, and whose purchase will necessarily lead to increase of output and consequent profit to his fellow ratepayers? It is said that corporations have no consciences—consequently members of their committees will descend to meanness that in private life they would condemn. Thirdly, is it policy to treat ratepayers in this high-handed manner? Certain officials have told me I shall soon tire of the gas, and shall return to electricity. Can any sane person think that this treatment is conducive to gaining me back as a customer? I feel sure that the consensus of opinion in the town will be that the department is evincing such profound stupidity as will seriously militate against future success.

The fact is that the Chairman and officials are losing their heads because gas, which they thought to stamp out as a competitor, is regaining its position, and many others like myself are again giving it a trial. But does this rivalry justify the purveyors of the younger light in descending to mean and paltry tricks such as a true sportsman would designate as "hitting below the belt"? Does an enterprising trader refuse to sell a small parcel because his customer is unwilling to purchase largely? If he acts so, he may be within his powers, as he alone suffers loss; but with a corporation it is the body of ratepayers who suffer by the spleen of their officials.

RATES AND GAS, ELECTRICITY, AND WATER CHARGES.

We have received from Mr. James Carter, the Borough Treasurer of Preston, a copy of his tabulated statistics of the rates levied together with the charges made for gas, electricity, and water, and profits and losses on municipal undertakings in a number of Provincial towns and a few Metropolitan boroughs, for the year 1908-9. There are in all ninety-one places referred to, which is one more than in the previous compilation—the new-comer being Batley. The populations range from 753,203 (Liverpool) down to 21,230 (King's Lynn).

The rateable values are highest in Westminster (£6,317,712), Liverpool (£4,679,520), and Manchester (£4,234,127); and lowest in King's Lynn (£85,197), Bacup (£86,236), and Brighouse (£87,804). The places most heavily rated are: Norwich, 9s. 10d.; East Ham, 9s. 3d.; West Ham, 9s. 2d.; Wolverhampton, 9s. 2d.; Halifax, 9s.; Rotherham, 9s.; and Swansea, 9s. in the pound. Those which have the lightest rates are: Oxford, 4s. 5d.; Lancaster, 4s. 10d.; and Bournemouth, 5s. in the pound.

Out of the rents of property and profits transferred from municipal undertakings, the rates are reduced in the following towns to the extent named: Macclesfield, 1s. 8½d. in the pound; King's Lynn, 1s. 8¼d.; Warrington, 1s. 7¾d.; Nottingham, 1s. 4d.; Stockport, 1s. 2½d.; Salford, 1s. 1½d.; Leicester, 1s. 0¾d.; Bolton, 1s. 0½d.; Burnley, 1s. 0¼d.; Darwen, 1s.; Dewsbury, 1s.; and Stafford, 1s. Bradford relieves the rates by trading and rents to the extent of ¾d. in the pound; Eastbourne, ¾d.; Hampstead, ½d.; and West Hartlepool, ½d. Out of the total of ninety-one places included in the list, fifteen made no profits at all; and a separate table gives thirty-eight instances in which the rates have been increased in consequence of losses in undertakings which were intended to be remunerative. The largest losses are shown on water; while gas does not appear at all in this particular part of the return. Water losses at Bacup were responsible for an addition of 2s. 0¼d. in the pound to the rates, and at Swansea of 1s. 6d.

Coming to the table giving the charges for gas and water, we find that the price of gas for domestic supplies is again highest at King's Lynn—3s. 6d. per 1000 cubic feet; while as usual it is the lowest at Widnes, at 1s. 2d. per 1000 cubic feet, with, of course, an even lower rate for very large consumers and engines. The following towns also enjoy the privilege of a gas supply at 2s. or less per 1000 cubic feet: Gateshead, 1s. 9⅝d.; Newcastle, 1s. 10½d.; Plymouth, 1s. 10½d.; Belfast, 1s. 11d.; Huddersfield, 1s. 11d.; Lancaster, 1s. 11d.; Sunderland, 1s. 11d.; Bradford, 1s. 11¾d.; Bath, 2s.; Bury, 2s.; Bristol, 2s.; Cheltenham, 2s.; Darlington, 2s.; and Tynemouth, 2s. The charge per B.T.U. for domestic supplies of electricity ranges from 6d. at Batley and Bournemouth to 3d. at Liverpool (average charge) and West Ham (flat rate). The charge for water for domestic purposes on a house of £15 rateable value is highest in Ashton-under-Lyne—2s. 2d. in the pound. It is lowest in the following towns: Liverpool, 7½d.; Brighton, 9d.; King's Lynn, 9d.; Leamington, 9d.; Manchester, 9d.; and Westminster, 9⅜d. The other places in which the charges are less than a shilling are: Bournemouth, Gloucester, Oxford, Plymouth, Reading, Salford, Widnes, and York. At Preston (Mr. Carter's own town), the rates are 8s. 10d. in the pound; and they are relieved to the extent of 7d. by the rents of property and the profits transferred from the reproductive undertakings. The price of gas is 2s. 11½d. per 1000 cubic feet; of electricity, 4½d. per unit; and of water, 1s. 2d. in the pound on £15 houses.

There is a table showing the amount estimated for the current year to be transferred to the borough, district, or other fund from the various profitable undertakings.

Explosion of Suction Gas.—A leak in the flange of the gasholder of a suction-gas plant at an electric block station in Berlin recently caused an explosion whereby much damage was done to brickwork and plant. Walls were blown down, and the cover of the holder and the supply-pipes were hurled a distance of 36 feet. Air is supposed to have entered the holder by the leak, and mixed with the gas, which became ignited.

Hampstead Public Lighting.—The Lighting Committee of the Hampstead Borough Council have been carrying out experiments in various roads in the borough with the view of converting 100 incandescent gas-lamps into metallic filament electric lamps. They have reported that at present they are not satisfied that the proposed change would be advantageous; and they have recommended that no further action be taken. At a recent meeting of the Council, an amendment to the effect that 100 gas-lamps should be converted to electric lamps in such streets as the engineer might select as being most suitable and economical was lost.

Gas in Artisans' Dwellings.—The Public Health Committee of the St. Pancras Borough Council reported, on Monday last week, that, in accordance with instructions received on the 23rd of September, it had been arranged with the Gaslight and Coke Company to carcass Goldington Buildings for the supply of gas on the same terms as those on which they carried out this work at the Flaxman Terrace Dwellings. The agreement entered into by the Council provides that the whole of the work is to be carried out by the Company at their own expense, including the provision of meters, pendants, and other necessary fittings. It further specifies that, upon the completion of the installation, no other means of artificial illumination than gas is to be provided for a period of five years, unless the Council agree to reimburse the Company the cost incurred by them.

DANGERS OF WATER-SLIDE CHANDELIERS.

Fatal Gas Explosion in Southwark.

On Monday, the 16th ult., an explosion of gas occurred at the George the Fourth public-house, in the Southwark Bridge Road, which caused serious injuries to the proprietor, Mr. Cooper Robinson, and his barman, a young man named John M'Kenzie Haines. The latter succumbed last Sunday week in Guy's Hospital, where Mr. Robinson still lies seriously ill.

At the inquest, which was held by Dr. F. J. Waldo last Thursday, the widow of the deceased man said her husband came home on the evening of the accident with his face bandaged, and stated that he and his employer both detected a strong smell of gas, but could not tell where the escape was. With the view of finding the source of leakage, her husband first went into the pantry and afterwards into the dining-room, where he saw that the chandelier had fallen on to the table. He called to Mr. Robinson, and then there was an explosion, which rendered him unconscious. Mrs. Robinson said she was ill at the time of the occurrence, and was not aware of the explosion till she was informed of it afterwards. The chandelier in the dining-room was one of the old-fashioned water-slide type, and was seldom used.

Mr. *A. W. Millar*, Outdoor Superintendent of the South Metropolitan Gas Company, said he visited the premises shortly after the explosion, and found the chandelier [produced] lying on the table in the dining-room. It was a very old one, and should not have been in use. These chandeliers should have water put into them about every two to three months; but this one, in all probability, had not been filled for many months.

The CORONER: These chandeliers are very dangerous?

Witness: Yes; they are.

Are you getting them removed?—Yes; we have sent round a circular to the public against these chandeliers, and have also asked builders not to have them placed in new buildings. We have also informed our customers that we will remove them and put up others in their stead. As a result, we are now removing a great number. These chandeliers are not being made now.

The CORONER: A good job too.

In reply to the Jury, witness said that the water-slide chandeliers were dying out fast.

The CORONER: Yes; and while they are dying out many more fatal accidents may happen. He added that this defective, old-fashioned chandelier had, without doubt, caused the explosion; and he said he was pleased to hear that the Gas Company were doing all in their power to get rid of them.

The medical evidence showed that the deceased sustained severe burns, and that death was due to shock to the general system following his injuries.

The Jury returned a verdict of "Accidental death;" adding a rider to the effect that these dangerous chandeliers should be removed, and cautioning the public against them.

PRICE OF GAS AT ROCHDALE.

The Rochdale Merchants and Tradesmen's Association have been discussing the price of gas; but though several members took part, no motion was moved on the subject, and the matter was allowed to drop.

In raising the question, Mr. H. Broughton remarked that, judging from the speech delivered by the Mayor (Mr. Dunning) when taking up office, he seemed inclined to go in for heavy profits on municipal trading; but this would be a mistake. The Council had decided to take £10,000 from the gas-works for the relief of the rates; and under these circumstances the Association would be justified in asking for a reduction of price. Mr. Oldham expressed the opinion that the Corporation would make a profit if they supplied gas at 2s. per 1000 cubic feet; but Alderman Collinge declared that he was as firmly convinced as ever that the talk about cheap gas was a "gallery" cry. The cry for free this and free that was always very popular with the general public; but the word "free" was a misnomer. Somebody had to pay for various articles supplied by the Municipality. If the Corporation reduced the price of gas, the rates would go up. The present charge was reasonable. The amount of profit made was exceedingly small in comparison with the capital at stake. He did not think that the Mayor was in favour of heavy profits. Mr. Smith said it was necessary that the gas-works should have a fairly large reserve fund. According to the agreement made with the outside districts to which they supplied gas, if the price was reduced to consumers in the borough it would also have to be reduced to those outside. The Chairman (Mr. Clark) remarked that excessive profits should not be made by any department. The sum of £10,000 taken from the gas-works to the relief of the rates was equal to a rate of 6½d. in the pound. During the past five years, the gas-works had contributed £73,616 to the relief of the rates. This was a fair amount for the general body of gas consumers to pay.

LIVERPOOL WATER-WORKS.

The Engineer's Report.

In his report for the year ending Dec. 31 last, Mr. Joseph Parry, Chief Engineer of the Liverpool Water-Works, gives a number of statistics relating to the undertaking, from which the following figures have been taken.

The quantity of water consumed in the city and surrounding district was greater by about 430⅝ million gallons than the quantity consumed in the previous year. This was an increase of 4⅜ per cent.; while the corresponding increase of population was only 1·09 per cent. Most of the increase occurred in dwelling-houses; but there was a rise of nearly 120 million gallons in the consumption through meters for trade and shipping purposes. There was also an increase of, in round numbers,

GAS COMPANIES' STOCK AND SHARE LIST.

Referred to on p. 612.

Issue.	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
590,000	10	Oct. 15	10	Alliance & Dublin 10 p.c.	17⅜—18½	..	5 9 7
268,324	10	,,	7	Do. 7 p.c.	12⅞—13½	..	5 5 8
310,000	Stk.	July 15	4	Do. 4 p.c. Deb.	100—102	..	3 18 5
200,000	5	Oct. 29	6¼	Bombay, Ltd.	5⅝—5⅞	..	5 10 8
40,000	5	,,	6¼	Do. New, £4 paid	3⅝—4⅛	..	6 6 1
50,000	10	Aug. 27	14	Bourne- mouth Gas & Water	29—30	..	4 13 4
51,810	10	,,	7	B 7 p.c.	16½—17	..	4 2 4
53,200	10	,,	6	Pref. 6 p.c.	15¾—16½	..	3 13 10
380,000	Stk.	Aug. 13	12½	Brentford Consolidated	245—248	..	5 0 10
300,000	,,	,,	9½	Do. New	187—190	..	5 0 0
50,000	,,	,,	5	Do. 5 p.c. Pref.	122—124	..	4 0 8
206,250	,,	June 12	4	Do. 4 p.c. Deb.	102—104	..	3 16 11
220,000	Stk.	Sep. 11	10½	Brighton & Hove Orig.	207—210	..	5 2 4
246,320	,,	,,	7¼	Do. A. Ord. Stk.	152—155	..	5 0 0
450,000	20	Oct. 15	10	British	42½—43½	..	4 11 11
109,000	Stk.	Aug. 27	6	Bromley, Ord. 5 p.c.	114—116	..	5 3 5
165,700	,,	,,	4¼	Do. do. 3½ p.c.	84—86	..	5 4 8
500,000	10	Oct. 15	7	Buenos Ayres (New) Ltd.	11—11½	..	6 1 9
250,000	Stk.	June 26	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
150,000	20	July 15	7½	Cagliari, Ltd.	25—26	..	5 11 6
100,000	10	—	—	Cape Town & Dis., Ltd.	4—5	..	—
100,000	10	Apl. 26	4½	Do. 4½ p.c Pref.	5—6	..	7 10 0
50,000	50	Nov. 3	6	Do. 6 p.c. 1st Mort.	47—49	+1	6 2 5
100,000	Stk.	June 26	4½	Do. 4½ p.c. Deb. Stk.	78—80	..	5 12 6
157,150	Stk.	Aug. 13	5	Chester 5 p.c. Ord.	108½—110½	..	4 12 7
1,493,280	Stk.	Aug. 27	5⅛	Commercial 4 p.c Stk.	106—108	..	4 16 4
560,000	,,	,,	5	Do. 3½ p.c. do.	103—105	..	4 15 3
475,000	,,	June 26	3	Do. 3 p.c. Deb. Stk.	82—84	..	3 11 5
800,000	Stk.	June 12	6½	Continental Union, Ltd.	109—111	+1	5 17 1
200,000	,,	,,	7	Do. 7 p.c. Pref.	140—142	+1	4 18 7
460,170	Stk.	—	5	Derby Con. Stk.	122—124	..	4 0 8
55,000	,,	—	4	Do. Deb. Stk.	103—105	..	3 16 2
148,995	,,	Sep. 30	5	East Hull 5 p.c. Ord.	93—100	..	5 0 0
486,090	10	July 15	12	European, Ltd.	23½—24	..	5 0 0
354,060	10	,,	12	Do. £7 10s. paid	17—17½	..	3 2 11
15,182,590	Stk.	Aug. 13	4/10/8	Gas- light and Coke	4 p.c. Ord.	100—101	..	4 9 9
2,600,000	,,	,,	3½		3½ p.c. max.	89—90	+½	3 17 9
3,799,735	,,	,,	4		4 p.c. Con. Pref.	105—107	..	3 14 9
4,193,975	,,	June 12	3		3 p.c. Con. Deb.	85⅛—86⅛	..	3 9 4
258,740	Stk.	Sep. 11	4⅔	Hastings & St. L. 3½ p.c.		95—97	..	4 17 11
82,500	,,	,,	1⅓	Do. do. 5 p.c.		113—115	..	5 8 8
70,000	10	Oct. 15	11	Hongkong & China, Ltd.		18—18½	..	5 18 11
123,500	Stk.	Sep. 11	6¼	Ilford "A" and "C"		131—133	..	4 17 9
65,780	,,	,,	5	Do. "B"		103—105	..	4 15 3
51,000	,,	June 26	4	Do. 4 p.c. deb.		103—105	..	3 16 2
4,040,000	Stk.	Nov. 13	8	Imperial Continental		181—183	..	4 7 5
473,600	Stk.	Aug. 13	3½	Do. 3½ p.c. Deb. Red.		95—97	..	3 12 2
195,242	Stk.	Aug. 27	6	Lea Bridge Ord. 5 p.c.		120—122	..	4 18 4

Issue	Share.	When ex-Dividend.	Dividend or Dividend & Bonus.	NAME.	Closing Prices.	Rise or Fall in Wk.	Yield upon Investment.
£			p.c.				£ s. d.
561,000	Stk.	Aug. 27	10	Liverpool United A	226—223	..	4 7 9
718,100	,,	,,	7	Do. B	166—168	..	4 3 4
306,083	,,	June 26	4	Do. Deb. Stk.	104—106	..	3 15 6
75,000	5	June 26	6	Malta & Medn., Ltd.	4⅛—4⅜	+⅛	6 6 4
560,000	100	Oct. 1	5	Met. of 5 p.c. Deb.	100—102	..	4 18 0
250,000	100	,,	4½	Melbourne 4½ p.c. Deb.	100—102	..	4 8 3
541,920	20	Nov. 13	3⅜	Monte Video, Ltd.	11⅛—12	−⅛	5 16 8
1,775,892	Stk.	July 30	4/12/6	Newc'tle & G'tesh'd Con.	108—110	..	4 4 1
418,460	Stk.	June 26	3½	Do. 3½ p.c. Deb.	92—93	+½	3 15 3
15,000	10	Aug. 27	10	North Middlesex 10 p.c.	20—20½	..	4 17 6
55,940	10	,,	7	Do. 7 p.c.	13⅜—14	..	5 0 0
300,000	Stk.	Nov. 27	8	Oriental, Ltd.	137—139*	+½	5 15 1
60,000	5	Sept. 30	8	Ottoman, Ltd.	6¼—6⅜	..	6 5 6
31,800	53	Aug. 27	13	Portsea Island A	138—140	..	4 18 6
60,000	50	,,	13	Do. B	132—134	..	4 17 0
100,000	50	,,	12	Do. C	122—124	..	4 16 9
114,800	50	,,	10	Do. D and E	104—106	..	4 14 4
398,490	5	Oct. 29	7	Primitiva Ord.	5 13/16 6 1/16	+1/16	5 15 6
796,980	5	July 30	5	Do. 5 p.c. Pref.	5 1/16—5 1/16	..	4 16 5
488,900	100	June 1	4	Do. 4 p.c. Deb.	96—98	..	4 1 8
1,000,000	10	Oct. 15	8	River Plate Ord.	13—13¼	..	6 0 9
312,650	Stk.	June 26	4	Do. 4 p.c. Deb.	93—95	..	4 4 3
250,000	10	Sept. 30	8	San Paulo, Ltd.	14—14½	..	5 12 3
125,000	50	July 1	5	Do. 5 p.c. Deb.	50—51	..	4 18 0
135,000	Stk.	Sept. 11	10	Sheffield A	240—242	..	4 2 8
209,984	,,	,,	10	Do. B	240—242	..	4 2 8
523,500	,,	,,	10	Do. C	240—242	..	4 2 8
70,000	10	Oct. 29	10	South African	13—13½	..	7 8 2
6,429,895	Stk.	Aug. 13	5/6/8	South Met., 4 p.c. Ord.	119½—120½	..	4 8 6
1,895,445	,,	July 15	3	Do. 3 p.c. Deb.	85⅛—86⅛	..	3 9 4
209,829	Stk	Aug. 31	8	South Shields Con. Stk.	152—154	..	5 3 10
05,000	Stk.	Aug. 13	5/6/8	S'th Suburb'n Ord. 5 p.c.	117—119	..	4 9 7
60,000	,,	,,	5	Do. 5 p.c. Pref.	121—123	..	4 1 4
117,058	,,	July 15	5	Do. 5 p.c. Deb. Stk.	124—126	..	3 19 4
502,310	Stk.	Nov. 13	5	Southampton Ord.	107—109	..	4 11 9
120,000	Stk.	Aug. 13	6¾	Tottenham A 5 p.c. and B 3½ p.c.	134—136	..	4 19 3
398,940	,,	,,	5¼		106—108	..	4 17 3
149,470	,,	June 26	4	Edmonton 4 p.c. Deb.	102—104	..	3 16 11
182,380	10	June 12	8	Tuscan, Ltd.	10⅛—10⅝	..	7 14 3
149,900	10	July 1	5	Do. 5 p.c. Deb. Red.	100—101	..	4 19 0
193,742	Stk.	Aug. 27	5	Tynemouth 5 p.c. max.	105—108	..	4 12 7
255,636	Stk.	Aug. 27	6¾	Wands- worth and Putney B 3½ p.c.	128—130	..	5 0 0
79,416	,,	June 26	3	3 p.c. Deb. Stk.	74—76	..	3 18 11
845,872	,,	Aug. 27	5⅛	West Ham 5 p.c. Ord.	106—108	..	4 14 11
185,000	,,	,,	5	Do. 5 p.c. Pref.	120—122	..	4 2 0
228,300	,,	June 26	4	Do. 4 p.c. Deb. Stk.	104—106	+1	3 15 6

Prices marked * are "Ex div."

36 million gallons in supplies by meter to consumers outside the compulsory limits. The compulsory area to which the Liverpool Water-Works Acts apply comprises 117·6 square miles; and the city has also a separate compulsory area in Chorley, a town of 30,000 inhabitants. Outside the compulsory area there is no obligation to supply, except so far as the Corporation have entered into voluntary agreements with local authorities and private individuals. There are altogether 33 separate supplies in bulk given from the Vyrnwy aqueduct, and 16 from the Rivington aqueduct—thus making a total of 49 supplies to local authorities and private individuals. A constant supply was steadily maintained throughout the year; and there was no difficulty in meeting every demand out of the abundant resources available.

No new works of importance were commenced during the year; but good progress was made with the new works already in hand. The driving of the Marchnant tunnel to Lake Vyrnwy was facilitated by the use of a new electric air-drill; and the culverting of the Rivington Goit at Brinscall was brought near to completion. There were, during the year, 127 extensions of leading and distributing mains, laid chiefly for the supply of new houses in and around the city. These included a length of 1060 yards of 12-inch pipes for the purpose of providing an improved supply to the Crosby and Blundellsands districts, and generally for the improvement of the pressure at the North-end; about 2300 yards of 9-inch and 6-inch pipes, for the purpose of supplying the district of Ince Blundell, and improving the supply to Little Crosby and Hightown; 640 yards of 9-inch pipes in Wavertree for fire protection and the improved supply to the district; and 785 yards of 9-inch pipes in Lister Drive, to provide an additional volume of water and increased pressure at the electric power station. New fire-mains were also laid for the purpose of affording adequate protection to the various buildings in Bootle.

The question of the rates to be charged for supplies by meter to manufacturers and other large consumers, engaged the special attention of the Water Committee towards the end of the year. A report was sent to each member of the City Council, giving information as to the practice in other towns, and showing the effect on the revenue of the department of different methods of charging, and particularly the result of adopting a graduated scale of charges instead of a uniform rate. The Committee decided not to depart from their long-established practice of charging the same rate per 1000 gallons to large and small consumers alike.

The total volume of water delivered from the works of the Corporation during 1907, including statutory compensation waters to rivers in Lancashire and Montgomeryshire, was 18,228,361,000 gallons. For trade purposes, 2,617,784,000 gallons (an average of 7,192,000 gallons per day) were supplied; and 251,239,000 gallons were furnished for shipping purposes. The maximum winter consumption in one day was on Jan. 29, and amounted to 35,938,000 gallons; the minimum in one day in winter was on Jan. 13 (a Sunday), when the consumption was 17,922,000 gallons. The maximum summer consumption was on July 19, and was 33,428,000 gallons; while the minimum in summer was 18,305,000 gallons, on Sunday, June 23.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

Notice is being given by the Musselburgh Gaslight Company of application for a Provisional Order for the reorganization of the Company. The Company are one of the few in Scotland—five in number—incorporated by Act of Parliament. The Corporation of Musselburgh are also giving notice of an application for a Provisional Order. [Particulars of both of these applications will be found in another part of to-day's "JOURNAL."]

At the first ordinary meeting of the Grangemouth Town Council after the elections, and while the Council were dealing with the minutes of the Gas Committee, Dean of Guild Marshall said he would like to specify several points which he considered the Committee should be charged to discuss. He thought it right he should do so at the Town Council, because the position of one or two of them was a little misrepresented at a public meeting held a few weeks before. All that they wished for was simply an inquiry into certain details in connection with the introduction of gas cookers and other things. There was a vast difference between condemning a scheme and simply asking that before they extended its scope a reasonable inquiry should be made into the details. The first point for consideration was, were they justified in supplying stoves to a certain section of the ratepayers at a hire which did not half cover the interest on capital, depreciation, input, and output? They had a capital of £1150 sunk in stoves; and as this was borrowed money, they paid interest at the rate of 3½ per cent. upon it, which amounted to over £40. The Burgh Chamberlain was writing off yearly a depreciation of £100; and when asked if he did not think it was rather a lot, he said it was on the safe side, and he did not consider it was a shilling too much. Secondly, were they justified in charging consumers using prepayment meters an extra rate of 10d. per 1000 cubic feet? A prepayment meter cost 34s. net.; a stove at that price could be rented for 2s. a year, and the gas consumer who averaged about 10,000 cubic feet per annum paid 8s. 4d. for the same thing. Thirdly, if the object were to encourage the sale of gas to local parties, they could fairly excuse those who had their own cookers or gas-engines. They had 17 gas-engine consumers, who paid them £146 for engines alone, besides lighting; and last year, owing to a depression in the building trade, a good number of those engines were relatively idle. There were five consumers who alone last year paid £93 for gas. In a return furnished there was shown an increased consumption on account of the introduction of stoves. But if they went over this return—dealing with thirty houses, ranging from the room and kitchen house to the self-contained building—they would find that, owing to the introduction of cookers in these houses, the total increase amounted to about £29 12s. 7d.; so that the proprietors of gas-engines paid them, besides the lighting bills, three times more than the increase they got from the whole of the thirty cookers, the statistics of which had been given them recently. There was no rebate or allowance

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GLASGOW.

GAS METER MAKERS.

made to the proprietors of engines; while the gas was almost entirely consumed when others were not using it at all. The fourth point he wished considered was the ratio between the increased cost of output and the increased cost of manufacture, upon which he would make no comment. Bailie Main, the Convener of the Gas Committee, supported the suggestions; and they were remitted to the Gas Committee for consideration.

A deputation from Scotch burghs waited upon the Secretary for Scotland and the Lord Advocate in London yesterday, with reference to the rating upon tramways and gas and water pipes. It cannot be doubted that an anomaly exists in the restriction of assessments within burghs to one-fourth of the valuation of these subjects, while in counties the assessments are allowed to be on the full valuation. Figures upon the subject were quoted by Lord Provost Gibson, of Edinburgh and Treasurer Graham, of Glasgow, sufficient to convince anyone of the necessity for the method of assessment being unified. The two Crown Officers waited upon were in agreement with the deputation as to the importance of the matter; but they declined to allow a clause to be inserted in the Local Government (Scotland) Bill at present before the House of Commons, because to do so would introduce contentious matter and endanger the passing of the measure. They also wish to hear what county and parish councils have to say upon the subject. There is regret that the proposal of the burghs is in the meantime rejected; but there is some hope that it may be taken up at another time, in connection with a larger scheme—that of placing the system of rating upon a more satisfactory basis than that on which, in many respects, it at present rests.

In the town of Portsoy, the gas-works are in the hands of the Corporation, who supply acetylene gas for lighting. The municipal election is in progress there; and on Thursday evening Provost Burgess, in the course of a statement regarding the work of the year, said that the town was now well cleaned and well lighted, and they had a good water supply. The gas undertaking was also in a satisfactory way. Gas was being sold at 5s. per 1000 cubic feet. They started at 6s.; and he was hopeful that it might be reduced still further.

It was a very sorry tale which was unfolded in the Sheriff Court at Dundee yesterday, in the trial of John Watt, the office caretaker, on a charge of stealing 3s. 9d. worth of tramway tickets and matches from the gas office, a report of which appears in another column. The authorities have been gasping to discover who stole the cash-box, containing £43, from the office in October last year; and when they got this poor man taking 8½d. worth of tickets, the feeling seemed to be to make an example of him. This has been done; and while his conduct in taking these tickets was exceedingly reprehensible, I cannot convince myself that it was so heinous as to merit the blasting of the character of a man who had been for forty-four years in the office, and who had a blameless record. A quiet dismissal, even if it had been thought necessary to go that length, would have been a merciful ending to this man's career, and would have had as much of a moral effect upon the staff, if that were the object aimed at, as prosecution and conviction.

A churlish correspondent, who does not give his name, writes as follows to-day in a local newspaper regarding the gas supplied by the Markinch Gas Company: "Complaints have been general for some time back of the inferior lighting qualities of the gas supplied by the Gas Company. Lighting is impossible without incandescent fittings, and even with those, owing either to the lack of pressure or to the use of an inferior coal, the lighting power is very defective. Considering the high rate charged (4s. 7d. per 1000 feet), and that the Company paid their shareholders 5 per cent. last year, besides paying £300 of their loan charge out of revenue, the consumers are entitled to better treatment."

The water supply to the towns in the county of Haddington along the shore of the Firth of Forth having long been known to be unsatisfactory, there is a movement in progress for obtaining a supply from the Edinburgh and District Water Trust. Terms have not yet been agreed upon; but notice has been published of the intention of the Haddington County Council to apply for a Provisional Order for the carrying of the proposal into effect.

CURRENT SALES OF GAS PRODUCTS.

Sulphate of Ammonia. LIVERPOOL, *Nov.* 28.

The market has again been weak, and values have declined further. Supplies seem to have been more plentiful, and makers have been willing to accept some reduction in prices; but in the face of a falling market it is difficult to interest buyers in regard to any purchases they can postpone, and fresh orders have again been scarce. The closing prices are £11 per ton f.o.b. Liverpool, and £11 3s. 9d. per ton f.o.b. Leith, while Hull is nominally £11 per ton f.o.b. The forward position fails to attract attention, notwithstanding tempting speculative offering everywhere abroad. For spring delivery, makers' ideas are £11 10s. to £11 12s. 6d. per ton, according to port.

Nitrate of Soda.

This article is quiet without change at 9s. 7½d. and 9s. 10½d. per cwt. for ordinary and refined qualities respectively.

Tar Products. LONDON, *Nov.* 30.

Pitch has been dull throughout the past week, and prices have a downward tendency. There is little business doing on the Continent, and what orders there are are being taken at very low figures—not only for near delivery, but also for delivery to the end of next year, and in some instances for delivery to the end of 1910. In South Wales, the market is quiet, and business is reported at low figures for delivery over the first nine months of next year. In London, one of the best makes has been sold at 20s. for January-June delivery, and it is doubtful whether this price could be repeated. On the east coast, it is possible to buy at 19s. to 19s. 6d. for delivery to the end of June next. In

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Manchester, offers were made at 19s. without success; and the value is probably not over 18s. 6d. f.a.s. Benzol 90 per cent. is quiet, and makers are still disposed to sell at low figures for delivery between now and the end of June next. Benzol 50-90 per cent. is firm, particularly in the North, where there appears to be a decided shortage of toluol, for which article there is a good demand, not only for prompt delivery, but for delivery all over next year. Solvent naphtha is fairly steady, and there is plenty of demand for both prompt and forward delivery. High-flash naphtha is rather quiet; the majority of consumers having covered the bulk of their requirements for next year. Carbolic is quiet and depressed, and Continental consumers continue to report purchases at 1s. 0¼d. to 1s. 0½d. on the east coast. Refined naphthalene is very weak; and salts are well maintained owing to the demand for creosote, which article is in good request, though there is no alteration in price.

The average values during the week were: Tar, 11s. 6d. to 15s. 6d., *ex* works. Pitch, London, 20s.; east coast, 19s. to 19s. 6d.; west coast, 18s. 6d. to 19s. 6d., f.a.s. Mersey ports; 18s. 6d. to 18s. 9d. other ports. Benzol, 90 per cent., casks included, London, 7d.; North, 6¼d. to 6½d.; 50-90 per cent., casks included, London, 7⅜d. to 8d.; North, 8d. Toluol, casks included, London, 9d. to 9¼d.; North, 9d. to 9¼d. Crude naphtha, in bulk, London, 3¾d. to 3⅞d.; North, 3½d. to 3¾d.; solvent naphtha, casks included, London, 11¼d. to 11⅜d.; North, 10¼d. to 10⅜d.; heavy naphtha, casks included, London, 11¼d.; North, 10¼d. Creosote, in bulk, London, 2⅞d. to 2 15/16d.; North, 2⅞d. to 2¾d. Heavy oils, in bulk, 3⅛d. to 3 3/16d. Carbolic acid, 60 per cent., casks included, east coast, 1s. 0¼d. to 1s. 0½d.; west coast, 1s. to 1s. 0¼d. Naphthalene, £3 10s. to £6 10s.; salts, 32s. 6d. to 35s., packages included and f.o.b. Anthracene, "A" quality, 1½d. to 1¾d. per unit, packages included and delivered.

Sulphate of Ammonia.

This article has been quiet during the past week, and prices have gradually declined. The Gas Companies still maintain their quotation for January-June; but ordinary makes can be secured upon Beckton terms in London at £10 18s. 9d. to £11 per ton. In Hull, business is reported at prices varying from £11 to £11 2s. 6d., according to quality; while a low figure has also been accepted in Liverpool. In Leith, the value is about £11 3s. 9d. to £11 5s.

COAL TRADE REPORTS.

Northern Coal Trade.

There is a steady demand generally for North-country coal, and a full inquiry for gas coals. In the steam-coal trade, much interest has been shown in the settlement of some large contracts for Sweden, many portions of which have been allotted to Durham collieries, at about 1s. per ton below the prices of the contracts now running out. For prompt delivery, best Northumbrian steams are about 10s. 9d. per ton f.o.b., second-class steams are 9s. 6d. to 10s. 4½d., and steam smalls are from 5s. to 6s. The present output is fairly well taken up; but forward sales of steams are few. As to gas coals, prices are steady for best Durham kinds. Prices are about 11s. per ton f.o.b for "Wear specials," 10s. 3d. to 10s. 6d. for Tyne bests, and from 9s. 3d. to 9s. 6d. for second qualities. A few forward sales have been booked, at prices rather below those for gas coals for some of the ports of the Mediterranean, for delivery over next year. At the same time, with the prospects of the working hours at the collieries being shortened, coalowners hesitate to make much concession. Coke is steady generally; but gas coke is more plentiful, and may be quoted at from about 14s. to 14s. 6d. per ton f.o.b.

Scotch Coal Trade.

Trade is quiet, and is showing no sign of improving. Ell for shipment is in less demand, and prices are easier. Splint is going more readily away; but prices are unchanged. Steam coal is very plentiful. Treble and double nuts are in good demand; but other classes of smalls are not so. The prices quoted are: Ell 9s. 9d. to 10s. 9d., splint 10s. 9d. to 11s., and steam 10s. to 10s. 3d. per ton. f.o.b. Glasgow. The shipments for the week amounted to 286,129 tons—a decrease of 7557 tons upon the previous week, and of 24,512 tons upon the corresponding week of last year. For the year to date, the total shipments have been 13,154,222 tons—a decrease of 195,022 tons upon the corresponding period.

West Dawlish Water Supply.—Twenty-one tenders were received by the Newton Abbot Rural District Council for carrying out works of water supply for the district of West Dawlish. The highest amount was £4637, and the lowest £2770. The latter, which was the offer of Messrs. G. Pollard and Co., of Taunton, was accepted.

Penrith Water Supply Arbitration.—Mr. C. R. Fenwick, as Umpire, with Messrs. J. W. Welsh and W. J. Heskett as Arbitrators, has been engaged on an arbitration between the Penrith Urban District Council and Mr. B. Pattinson, to settle the amount to be paid for the acquisition of land in connection with the construction of waterworks at Haweswater Lake. The claim was for £3707; but the Council's experts valuing on the basis of agricultural land, put the figure at from £250 to £350. One of the witnesses—Mr. C. J. Lomax—said that Nature had provided an ideal supply of water at Haweswater, which was a lake among the mountains, 1400 feet above sea-level, and 1000 feet higher than Penrith. The water lay in a hollow, with such an outlet as required only a small dam to raise the level of the lake to any required height. The water was perfect; being free from every kind of pollution. There was no possibility of contamination. The claimant asserted that the land which the Council would require for raising the level would take away all that was of value for grazing, leaving him with only the rough fell land. The rainfall was 92 inches per annum; so that for practical purposes there was unlimited water. A number of other cases depend to a large extent upon the decision that may be given in this arbitration.

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(*Incorporating Maughan's Patent Geyser Co.*),

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GAS COOKERS,

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Hemsworth and District Gas Company.

The first ordinary general meeting of the shareholders of the Hemsworth, Grimethorpe, and District Gas Company was held at Hemsworth last Thursday. Mr. R. Porter, of Elland, presided, and in submitting the Directors' report and statement of accounts for the year ended Sept. 30, said it was gratifying to the Board to meet the proprietors on this occasion, because the efforts put forth, and the policy pursued, had met with the approval of their consumers, and the operations had been conducted on lines profitable to the shareholders. Improvements had been made to their retort plant, a new scrubber and exhauster and engine-house had been provided, an overhead tank had been erected, and 18,384 yards of new mains and 19,189 yards of services had been laid. In the fitting-up of consumers' property, 41,928 yards of lead tubing, 7000 pendants and brackets, and 1100 grillers had been fixed free. The increased sale of gas over the previous year was at the rate of 68 per cent.; and the increased sale for the current year up to date was at the rate of 118 per cent. The number of meters in use was 1643 prepayment and 480 ordinary. Future prospects were most encouraging. The report and accounts were unanimously adopted, and a dividend at the rate of 5 per cent. per annum was declared. The Directors and the Manager and Secretary (Mr. Benjamin Porter) received many expressions of approval from the shareholders on the success of the year's working; and the usual vote of thanks brought the meeting to a close.

A Loss at Aberavon.

In his report on the last year's working of the Aberavon Corporation Gas Department, Mr. A. J. Bond, the Manager, points out that there is a considerable increase in the cost of coal, amounting to £865. This is accounted for by the higher cost per ton as compared with the previous year (the average being 1s. 8d. per ton more), and also to the greater quantity of gas produced requiring more coal, and to the reduced yield per ton carbonized. The gas produced was 36,562,600 cubic feet; the estimated quantity of coal used being 3840 tons, or a yield of 9520 cubic feet per ton. There is a large increase in wages for the production of gas, and in the cost of lime for purification. The increase in wages is partly due to the extra staff engaged at the same time at the old and new works during a period of four months, and to extra men on purifiers, and increased rate of pay to stokers. On the revenue side, the increase in gas sold amounts to 2,511,000 cubic feet, or £483. Coke and tar show an increase of £136. The gross profit earned is £1438; being £329 less than the previous year. There is a deficiency of £393 on the year's working, on account (1) of the increase in the repayment of loan and interest charges, amounting to £1842, the increase in this item being £652; (2) the working costs being higher during the year; and (3) that the increased loan payments were due before the new works were properly started. Mr. Bond thinks that, under the circumstances, the Corporation may consider the position to be fairly satisfactory. With increased consumption, and, he trusts, a decrease in the price of coal, there is, he says, a good prospect of far better results for the future.

Unfounded Claim for Demurrage on a Cargo of Coal.

In a Divisional Court of the High Court of Justice a few days ago, Sir Gorell Barnes and Mr. Justice Bargrave Deane had before them an appeal from a judgment of his Honour Judge Thomas, in the Liverpool County Court, pronouncing the owners of the barque *August Leffler* (Messrs. Henricksen and Coldevin), of Christiania, liable in damages to Mr. Thomas Duxbury, of Manchester, for breach of contract. In August last year, Mr. Duxbury agreed to sell to the above-named firm a quantity of coal, f.o.b. Garston, for shipment to Christiania, cash against documents. They thereupon chartered the barque to carry the coal; the charter-party providing that the vessel was to be loaded in six working days, "as per usual colliery guarantee;" that for all claims of average, as well as for payment of the freight, the captain was to hold himself to the cargo and the receiver thereof, and not to the shipper; but that the charterer was not to be responsible for any claim incurred at the port of loading, and demurrage, &c., was to be settled where due. During loading a dispute arose as to when the lay days began and ended; and, in the result, the master of the vessel, who claimed 18 days' demurrage, refused to sign clean bills of lading. Under protest, however, he signed bills bearing words which, as held by the County Court Judge, gave him a lien for the alleged demurrage. On the vessel reaching Christiania, the owners refused to deliver the coal until demurrage at the rate of £10 10s. a day for 18 days was paid. This amount was deducted by the consignees in paying the seller the invoice price of the coal; whereupon Mr. Duxbury sued the owners to recover £210 as the damages he had sustained in consequence of the action of the shipmaster. The Judge in the Court below held that the words "as per usual colliery guarantee" covered a breakdown at the colliery, which was the real cause of the delay in loading, and that consequently no demurrage was due. He therefore gave judgment for the amount claimed, with costs. The shipowners thereupon appealed, and contended that no such thing as a "colliery guarantee" was known at Garston. Their Lordships, however, dismissed the appeal, with costs.

Incorporated Joint Committee on Water Regulations.—A Company has lately been registered under this title with 100 members, each liable for £1 in the event of winding-up. The word "limited" is omitted from the title by licence of the Board of Trade. Only the signatories to the Memorandum of Association, and not more than two persons nominated by each water authority or other body approved by the Board of Trade, two by the Association of Water Engineers, two by the Worshipful Company of Plumbers, and two by the Royal Institute of British Architects, together with eight elected by the new Association, are eligible for membership. The management is vested in the members. The registered office is at No. 1, Adelaide Buildings, London Bridge, S.E.

AFTER 2 YEARS!!!

"BLAND" Burners fixed
TWO YEARS AGO are still giving the greatest satisfaction!!

A Test extending over such a period cannot be disregarded. It speaks for itself.

ST. MARY'S HOUSE,
ROSS,

28th Oct 1908

Dear Sirs

The 5'5 "Bland Light" fixed in Ross Parish Church two years ago, are still giving the greatest satisfaction.

I herewith enclose for your instruction the Gas Co's a/c for the past twelve months, & you will note the small consumption of 46,900 ft. @ 4/2 = £9.9.9. against naked lights two years ago of £32.13.3

Yours faithfully
W. Watkins
Churchwarden

Messrs Bland & Co
London.

HIGHEST AWARD
Franco-British Exhibition 1908,
GOLD MEDAL.

For full particulars of these celebrated Inverted Gas Burners for CHURCH, FACTORY, SHOP, or DOMESTIC LIGHTING, write:—

THE BLAND LIGHT SYNDICATE, LTD.,

63, Queen Victoria Street,
LONDON, E.C.;
or 20, Fennel St., off Corporation St.,
MANCHESTER.

Portsmouth Water Company.—The half-yearly meeting of this Company was held last Thursday; the chair being occupied by Mr. W. Grant, J.P., who stated that the revenue of £37,266 was an increase of £600 upon the corresponding period of last year. There was a sum of £22,947 carried to the profit and loss account, bringing it up to £27,336, which enabled the Directors to recommend the payment of the full statutory dividends, and leave £8360 to be carried forward. The water pumped from Havant and Bedhampton had been 1,461,209,237 gallons, which was an average daily supply for all purposes of 7,984,750 gallons; being 24·44 gallons per head. The expenditure had been decreased by £800 on the half year—showing that the Resident Engineer (Mr. Herbert Ashley) had been exercising the strictest economy. He, with the Engineer, had thoroughly inspected the new filtration beds, and was able to say that good progress was being made. The report was adopted; and the Directors were authorized to raise further money on mortgage or by the issue of debenture stock, in accordance with the Act of 1906.

Neath and the South Wales Electrical Power Works.—Like Bridgend, the Neath Rural District Council are desirous of purchasing the power station belonging to the South Wales Electrical Power Company which is in their district; and Mr. H. S. Bidwell last week held an inquiry into an application to borrow £18,000 for this and other electric lighting purposes. The Clerk (Mr. E. Powell) explained that the generating station, which had been erected by the Power Company, would cost £8000, and the purchase included 8 acres of freehold land valued at £2500, and also 1100 yards of cable worth £3000, which would be taken up and relaid elsewhere. The remaining £11,000 was made up of amounts overspent on previous loans, money spent on cables in anticipation of loan, proposed additional expenditure on the generating station, and alterations and extensions to high-tension mains in order to cope with the increasing demand of the district. In 1905, the Council commenced taking a supply of current from the South Wales Company; but in less than twelve months they had to subsidize the Company by increasing their payments from 1⅜d. per unit to 3½d., which was the cost of working the station. The Council had power to purchase the station out of the rates. There was some opposition to the application.

Opening of Water-Works at Dunmow.—Last Tuesday was a red-letter day in the history of Dunmow, for then the Earl of Warwick officially opened a water-works installation which has been provided by a Company to supply the district with this necessary of life. The works consist of a pumping-station, with pumps and engines in duplicate, and a reservoir. Mr. Mackenzie-Richards has acted as Engineer to the scheme; while the Contractors were Messrs. Williams and Carnall, of Clapham. After the Earl had unlocked the door of the pumping-station with a gold key, the Engineer explained that there were two 6½-H.P. Crossley gas-engines, and a specially-designed bore-hole pump (Ashley's patent), which ran extremely smoothly, and was capable of delivering 85,000 gallons per hour. The bore-hole was 300 feet deep, and 10 inches diameter to 110 feet, and 6½ inches the remainder of the depth. It was sunk 117 feet into chalk; and the yield of water after a prolonged test of five days was at least 5000 gallons per hour. The water stood at 32 feet from the surface, under a good head. Pumping at 5000 gallons per hour only reduced the level a foot; and when the pump was stopped, the water came back instantly. Pumping 7500 gallons an hour lowered the water 5 feet, but again it came back instantly—showing that they had a copious supply. Dr. Thresh, who has examined the water chemically and bacteriologically, pronounces it to be of excellent quality, of moderate hardness, and typical chalk water.

Gas Fatality at Swansea.—A Swansea foreman coal-trimmer named Protheroe was last Sunday week found suffocated by gas. He went to bed on the Saturday night; and as he did not come down for dinner on Sunday, his son went to his room. The door was locked; and the place smelt strongly of gas. The son burst open the door, and found his father lying undressed and unconscious across the bed. The gas was out, but not turned off.

Suicide by Gas at Vauxhall.—Alexander Hutchinson, who was formerly a licensed victualler at Tunbridge Wells, some days ago committed suicide at his lodgings in the Vauxhall Bridge Road. He was found lying on his bed with his head in a pillow-case, which was secured round his neck with string. An india-rubber tube leading from the gas-pipe was in his mouth; and the gas was turned on. Deceased's wife (from whom he was separated) said he was given to intemperance, and had had business troubles.

The South Hants Water-Works Company have arranged to increase their capital by upwards of £6000; and 600 new £10 ordinary shares will be offered to public competition at the Dolphin Hotel, Southampton, next Friday.

The Parkinson Stove Company, Limited, have opened new London offices and show-rooms at No. 129, High Holborn, W.C., within a few doors of Kingsway; and the show-rooms and offices at No. 58, Finsbury Pavement, E.C., have been closed.

The advantages claimed for the "Glasmi" incandescent gas mantle, with illustrations of both upright and inverted forms, are set forth, under the heading of "The Science of Economy," in an attractive show-card by Messrs. J. & W. B. Smith, of Farringdon Road, E.C.

With the title of "Warmth in Public and Other Buildings," the Richmond Gas-Stove Company are issuing a booklet mainly intended to introduce the firm's "Monarch" radiators and other apparatus for the heating of churches, chapels, theatres, schools, halls, greenhouses, motor-sheds, &c. It is a companion production to the booklet, "Warmth in the Home," which we recently noticed.

In the "Engineering Notes" in the "Western Mail" last Friday, reference was made to the illumination of the Drill Hall at Cardiff on the occasion of the mass meeting recently addressed by Mr. Balfour. Though electric lighting was very freely employed, the writer of the notes expressed his pleasure at seeing that incandescent gas was able to hold its own; for he says "there was one very large burner, with a single mantle, near the centre of the hall, that outshone the brilliancy of the electric lamp considerably."

The fourth annual dinner of the Swansea branch of the National Gas-Workers' and General Labourers' Union took place at the Royal Hotel last Wednesday; Mr. George Andrews (Manager of the Gas-Works) presiding. The District Secretary (Mr. V. Morgan), in proposing the toast of the "Swansea Gas Company," emphasized the good feeling existing between the management and the men, as shown by the readiness at all times to assist, as far as possible, in the betterment of the conditions of labour, and also from time to time granting increases in wages. In responding, Mr. Andrews said that during the year trade at the gas-works had been fairly good; and they had been able to keep the staff of 200 men in full employment—summer as well as winter. The Company were in a satisfactory position, and were doing all they could to improve the men's conditions of work. They had fitted up new lavatories and bath-rooms for the men at a cost of over £300; and they hoped to put up a reading and recreation room.

WANTED, FOR SALE, CONTRACT, &c., ADVERTISEMENTS IN THIS WEEK'S "JOURNAL."

Situations Vacant.

MANAGER. Guildford Gas Company. Applications by Dec. 8.
TRAVELLERS. No. 5026.
GAS-FITTER. No. 5028.

Situations Wanted.

RENTAL CLERK OR COLLECTOR. No. 5020.
REPRESENTATIVE (IRON OR COAL FIRM). No. 5025.

Ross on "Air as Fuel," &c.

COPY OF 1875 EDITION WANTED. 9, Agnew Street, Lytham.

Plant, &c. (Second-Hand), for Sale.

LAMP COLUMNS. Stoke-on-Trent.

Stocks and Shares.

DERBY GASLIGHT COMPANY. Dec. 9.

TENDERS FOR

Fire-Clay Goods.

LEEDS GAS DEPARTMENT. Tenders by Dec. 19.

Oil for Gas Making.

LEEDS GAS DEPARTMENT. Tenders by Dec. 12.

Petrol Air Gas System. No. 5027.

OXIDE OF IRON.

O'NEILL'S OXIDE
For GAS PURIFICATION.
LARGEST SALE OF ANY OXIDE.

SPENT OXIDE PURCHASED IN ANY DISTRICT.

GAS PURIFICATION & CHEMICAL CO., LD.,
PALMERSTON HOUSE,
OLD BROAD STREET, LONDON, E.C.

WINKELMANN'S
"VOLCANIC" FIRE CEMENT.
Resists 4500° Fahr. Best for GAS-WORKS.
ANDREW STEPHENSON, 182, Palmerston House, Old Broad Street, London, E.C. "Volcanism, London."

GAS TAR wanted.
BROTHERTON AND CO., LTD., Tar Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

J. & J. BRADDOCK (Branch of Meters Limited), Globe Meter Works, OLDHAM, and 54 & 47, Westminster Bridge Road, LONDON, S.E.
WET AND DRY GAS-METERS, PREPAYMENT METERS, STATION METERS, AND GOVERNORS.
REPAIRS RECEIVE PROMPT ATTENTION.
Telephones: 815 Oldham, and 2412 Hop, London.
Telegrams:—
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OXIDE OF IRON (BOG ORE).
ANY QUANTITY. ANY PORT. ANY STATION.
DONALD M'INTOSH,
110, CANNON STREET, LONDON.

PINCHBECK'S Meters and Burglar PROOF STRONG BOX.
See illustrated advertisement, Nov. 10, p. I. of Centre.
PINCHBECK LIMITED, Adams Place, George's Road, HOLLOWAY, N.

AMMONIACAL Liquor wanted.
BROTHERTON AND CO., LTD., Ammonia Distillers. Works: BIRMINGHAM, GLASGOW, LEEDS, LIVERPOOL, WAKEFIELD, AND SUNDERLAND.

OXIDE OF IRON.
(NATURAL.)
SPENT OXIDE PURCHASED.
BALE'S FIRE CEMENT.
PAINT FOR GAS-WORKS.
BALE & CHURCH,
5, CROOKED LANE, LONDON, E.C.

SULPHURIC ACID.
SPECIALLY prepared for the Manufacture of SULPHATE OF AMMONIA.
SPENCER CHAPMAN & MESSEL, LTD., with which is amalgamated WM. PEARCE & SONS, LTD., 86, Mark Lane, LONDON, E.C. Works: SILVERTOWN.
Telegrams: "HYDROCHLORIC, LONDON."
Telephone: 341 AVENUE.

J. E. C. LORD, Ship Canal Tar Works, Weaste, Manchester. Pitch, Creosote, Benzols, Toluol, Naphtha, Pyridine, all kinds of Cresylic Acid, Carbolic Acid, Sulphate of Ammonia, &c.